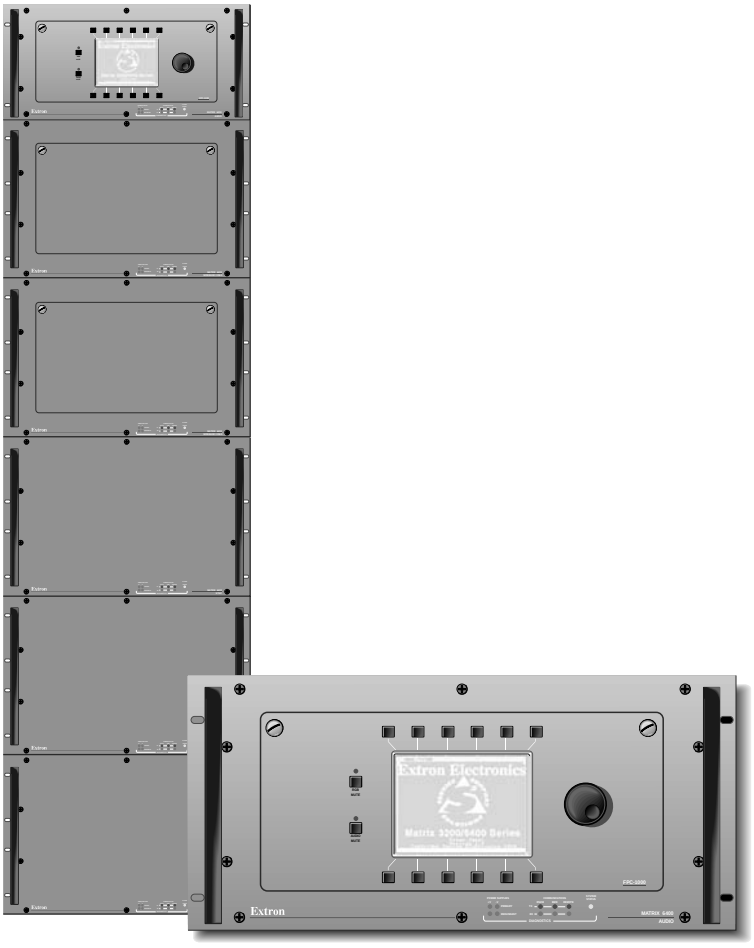
Extron® Electronics
INTERFACING, SWITCHING AND DISTRIBUTION

# User's Manual




# *Matrix 3200 and 6400 Series*

## Video Switcher

68-355-04 **Rev. E**
Printed in the USA
11 02

# Precautions

## Safety Instructions • English

**This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.**

**This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.**

### Caution

**Read Instructions** • Read and understand all safety and operating instructions before using the equipment.

**Retain Instructions** • The safety instructions should be kept for future reference.

**Follow Warnings** • Follow all warnings and instructions marked on the equipment or in the user information.

**Avoid Attachments** • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

### Warning

**Power sources** • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

**Power disconnection** • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

**Power cord protection** • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

**Servicing** • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

**Slots and openings** • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

**Lithium battery** • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

## Consignes de Sécurité • Français

**Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).**

**Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.**

### Attention

**Lire les instructions**• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

**Conserver les instructions**• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

**Respecter les avertissements** • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

**Eviter les pièces de fixation** • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

### Avertissement

**Alimentations**• Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

**Déconnexion de l'alimentation**• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

**Protection du cordon d'alimentation** • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

**Réparation-maintenance** • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

**Fentes et orifices** • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

**Lithium Batterie** • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

## Sicherheitsanleitungen • Deutsch

**Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.**

**Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.**

### Achtung

**Lesen der Anleitungen** • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

**Aufbewahren der Anleitungen** • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

**Befolgen der Warnhinweise** • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

**Keine Zusatzgeräte** • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

### Vorsicht

**Stromquellen** • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

**Stromunterbrechung** • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

**Schutz des Netzkabels** • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

**Wartung** • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

**Schlitze und Öffnungen** • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

**Litium-Batterie** • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

## Instrucciones de seguridad • Español

**Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.**

**Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.**

### Precaucion

**Leer las instrucciones** • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

**Conservar las instrucciones** • Conservar las instrucciones de seguridad para futura consulta.

**Obedecer las advertencias** • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

**Evitar el uso de accesorios** • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

### Advertencia

**Alimentación eléctrica** • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

**Desconexión de alimentación eléctrica** • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

**Protección del cables de alimentación** • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

**Reparaciones/mantenimiento** • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

**Ranuras y aberturas** • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

**Batería de litio** • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

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## The following icons may be used in this manual:

_____ *Important information – for example, an action or a step that must be done before proceeding.*

_____ *A Warning – possible dangerous voltage present.*

_____ *A Warning – possible damage could occur.*

____ *A Note, a Hint, or a Tip that may be helpful.*

_____ *Possible Electrostatic Discharge (ESD) damage could result from touching electronic components.*

_____ *Indicates word definitions. Additional information may be referenced in another section, or in another document.*

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# Chapter One

# Introduction to the Matrix 3200/6400 Video Switcher

*What is a Matrix 3200/6400 Video Switcher?*

*Features*

*Specifications*

## What is a Matrix 3200/6400 Video Switcher?

The Matrix 3200/6400 Video Switchers may be used with composite video, S-Video and component video. The Switchers are housed in 5U high rack-mountable metal enclosures with internal universal switching power supplies. They may be used as stand-alone video switchers or as part of a Matrix 3200/6400 system switcher.

In most installations an RS-232 program will be used to control the Matrix 3200/6400 Video Switcher as a stand-alone or as part of a system switcher. Control can be from any user-supplied controlling device capable of generating the proper commands such as a PC using Extron's Windows® control software or AMX, Crestron, etc. An optional Front Panel Controller enables the user to perform most configuration operations at the switcher.

See "Matrix 3200 & 6400 Video Switcher System Overview" on Page 1-5.

### Features

- *Supports Composite video, S-Video and Component video*
- *Virtual input and output assignments*
- *Microprocessor Control*
- *Independent matrix switching outputs*
- *32 Global Preset configurations stored in nonvolatile memory*
- *10 Room configurations with 10 Presets per room*
- *RS-232/RS-422 (serial port) control*
- *Rack mountable metal enclosure with internal Universal Power Supplies*
- *Redundant power supplies (Optional)*
- *FPC 1000 Front Panel Controller (Optional)*
- *MKP 1000 and MCP 1000 remote keypads control switching in remote rooms (Optional)*

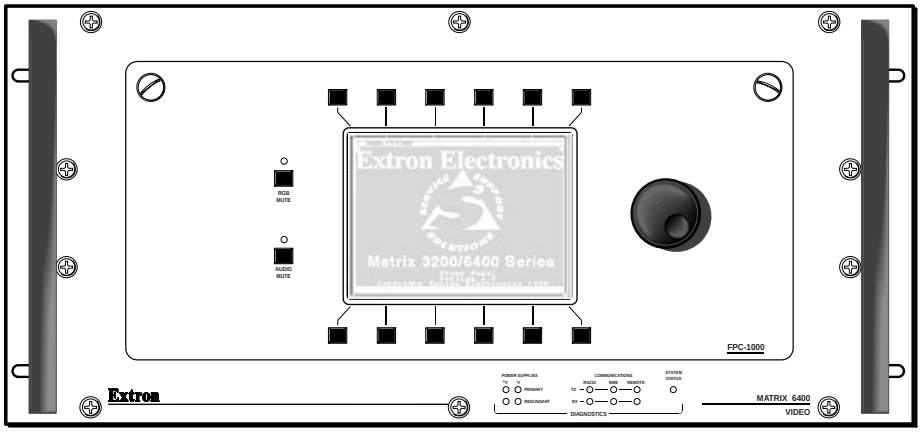



Figure 1-1.A Matrix 6400 Video Switcher w/optional FPC 1000

## Feature Descriptions

**Virtual Control –** Logical assignment of physical Input/Output connector.

**Microprocessor Control –** A Microprocessor enables the Matrix 3200/6400 Video switcher to be programmed from a host system, or from the optional Front Panel Controller (FPC 1000).

**Global Preset configurations (32 +1 ) –** Thirty-two Global Preset configurations plus the current I/O configuration are stored in nonvolatile memory. As new configurations are developed, they may be stored as Global Presets (up to a total of thirty-two) in the Preset memory. Any preset may later be recalled – instantly setting the switcher to the desired configuration.

**Room configurations –** 10 Room configurations with 10 Presets for each Room enables 10 different remote locations to control switching for that particular location using an **optional MKP 1000** or **MCP 1000 Remote Keypad**. Room Configurations may be significantly different from room to room and would probably only include a select number of inputs and outputs per room.

**Memory –** Nonvolatile memory contents remain valid after power is removed normally or due to a power failure.

**RS-232/RS-422 –** The Matrix 3200/6400 Video Switcher can be controlled by any remote Host system with serial communications capability.

**Rack Mountable metal enclosures –** Matrix Video Switchers are housed in 5U high, rack mountable-metal enclosures. An internal switch mode power supply is standard for all models.

**Modular Design –** The modular design of the Matrix 3200/6400 Video Switcher provides flexibility and expandibility by allowing users to purchase only the modules required for their systems. BMEs may also be upgraded by adding output video cards (8 outputs/card).

**Redundant Power Supply (Optional) –** If the main power supply fails, the Redundant Power Supply will take over automatically.

**FPC 1000 Front Panel Controller (Optional) –** The FPC 1000 mounts in place of the blank access panel in the master module (BME #0) and enables the user to perform most configuration operations at the switcher. See FPC 1000 User's Manual (Extron Part #68-355-02).

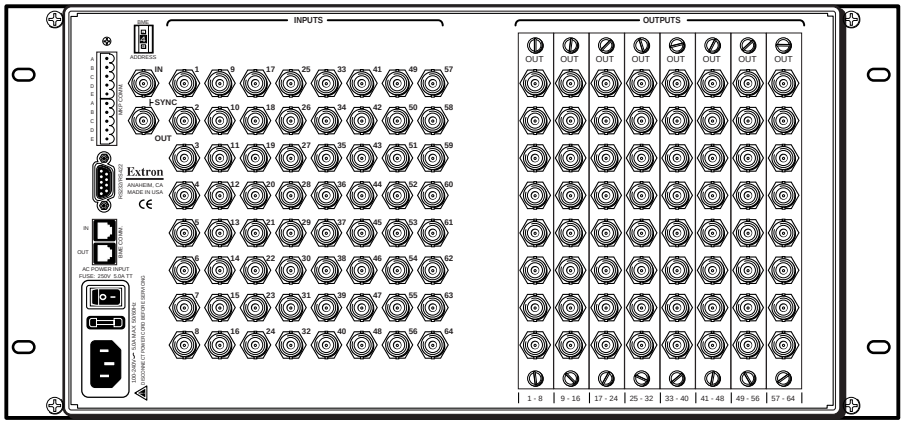
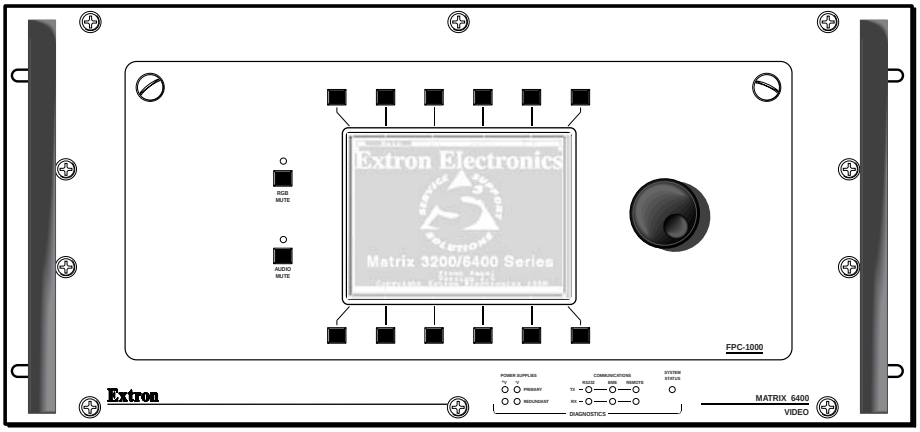
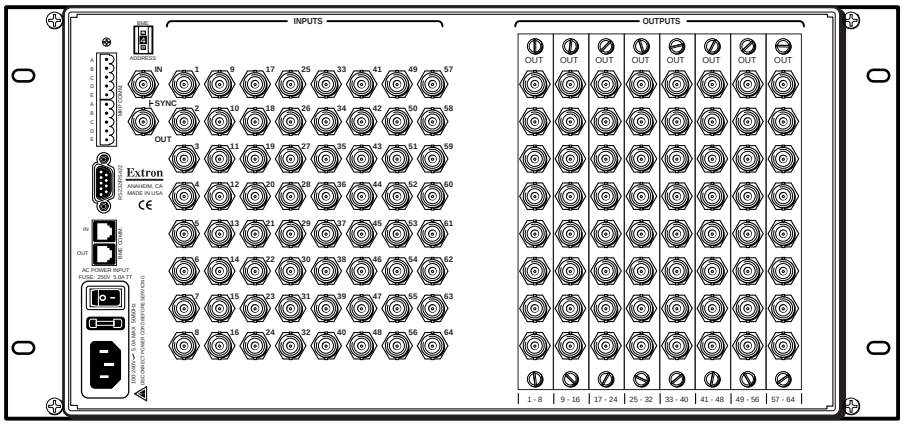



Figure 1-2.A Matrix 6400 Video Switcher (Rear Panel View)

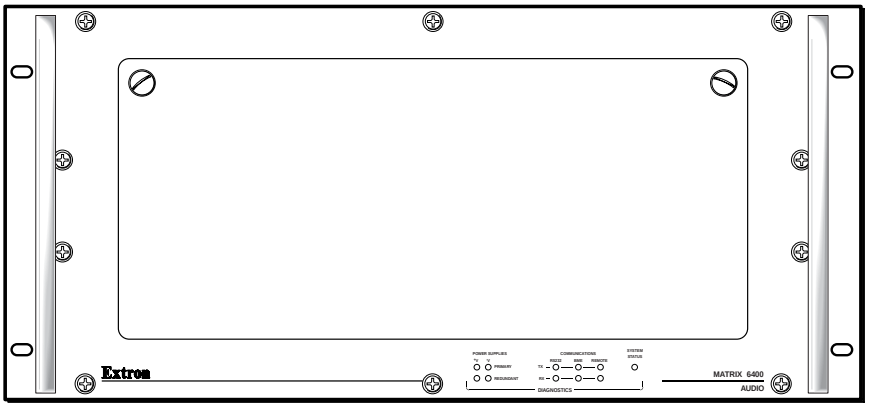
Matrix 6400 Video Switcher (Front View) - shown with optional Front Panel Controller (FPC 1000)



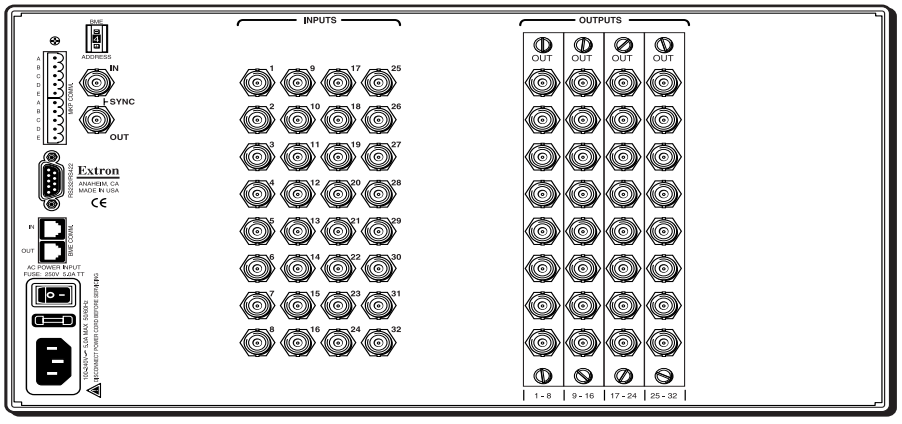

Matrix 6400 Video Switcher (Rear View) - shown with 8 Video Output cards installed.



Matrix 3200 Video Switcher (Front View) - shown with a blank access panel.




Matrix 3200 Switcher (Rear View) - shown with 4 Video Output cards installed.




### Matrix 3200/6400 System Manuals

This manual (68-355-03) covers the Matrix 6400 Audio Switcher. Following is a list of related manuals:

- *68-355-01 = MKP 1000 User's Manual*
- *68-355-02 = FPC 1000 User's Manual*
- *68-456-01 = MCP 1000 User's Manual*
- *68-355-04 = Matrix 3200 and 6400 Video User's Manual*
- *68-355-05 = Matrix 3200 and 6400 Wideband Video/Sync User's Manual*

## Matrix 3200 & 6400 Video Switcher System Overview

A Matrix 3200/6400 Video Switcher System may consist of 1 to 3 Matrix 3200 and/or Matrix 6400 Video BMEs (Basic Module Enclosures). Three video formats are supported, composite video, S-Video and component video. The switcher system may be dedicated to any one video format or a combination of all three formats in almost any configuration. What makes this possible is the switcher's unique ability to accept virtual connector assignments of its physical connectors. Virtual assignments are done through the RS-232 serial port of the switcher from a Host computer using Extron supplied software. If a system consists of more than one switcher, the Host computer communicates with the switcher designated as BME #0 which communicates with the other switcher(s). When Virtual assignments have been completed, the system is considered to be Virtualized.

One or more physical input connectors may be assigned as any Virtual input number, the same is true of the output connectors. Virtual input and output assignments are done through BME #0's RS-232/RS-422 communications port with a PC computer using Extron's Matrix 3200/6400 System Virtualization/ Control software. This will probably need to be done during initial system installation (before installing input and output cables) and would not normally need to be repeated unless the system configuration changed. After the Virtual inputs and outputs have been assigned (the system has been Virtualized), the input and output cables are installed. Input/output selection (Ties and/or Presets) may be done through the RS-232/RS-422 port with a PC Host or from a touch screen or any other user-supplied controlling device, such as AMX, Creston, etc., that is capable of generating the proper commands, or, with an optional FPC 1000 Front Panel Controller.

Figure 1-5.A is an example of a Virtualized Matrix 3200 Video Switcher with 16 S-Video inputs and 4 S-Video outputs. The circles represent BNC connectors, the physical connector number is shown just outside each circle (one o'clock position). The Virtual assignment for each connector is shown inside the circle; for example, physical input connectors 1 and 2 are Virtual input #1 (Y1 and C1). If Virtual input #1 is tied (switched) to Virtual output #4, the YC video on physical input connectors 1 and 2 will be output to physical output connectors 7 and 8.

Blank Virtual Matrix work-sheets which may be copied and used to assist in Virtualizing a system are provided in Appendix A. The Matrix 3200/6400 System Virtualization/Control software may also be used to print maps which show the physical connectors to Virtual assignments and make it easy to cable a system.

A Matrix 3200/6400 System Virtualization/Control Software Tutorial with instructions for Virtualizing a system is provided in Chapter 3 of this manual.

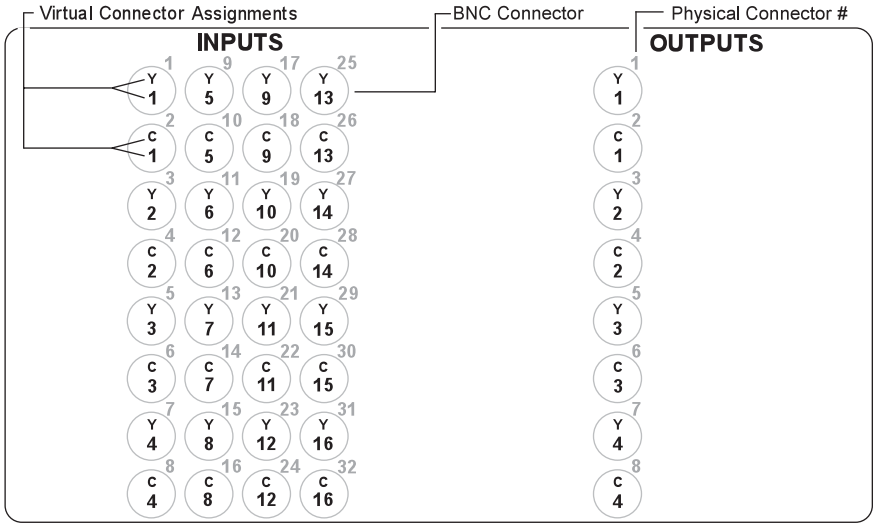



Figure 1-5.A 32x8 Video Switcher BME virtualized for 16x4 S-Video matrix.

## Matrix 3200 Video and Matrix 6400 Audio Switcher System

A Matrix 6400 Video Switcher System may include a Matrix 6400 Audio Switcher which would enable the system to switch both video and audio. Figure 1-6.A below is an example of a virtualized 16x8 S-Video configured Matrix 3200 Video Switcher (top chassis) combined with a 32x8 Matrix 6400 Audio Switcher (bottom chassis). Audio-follow/breakaway are among the supported features of mixed video and audio configurations.

Virtualization (mapping) of the sytem in Figure 1-6.A below shows virtual audio inputs 1 - 16 mapped to follow virtual video inputs 1 - 16. Audio inputs 17 - 32 are shown mapped as unassigned to specific video inputs but available to all video inputs. Input to output connections (ties) including audio breakaway may be made via a Host computer/control device or from an FPC 1000 Front Panel Controller.

### Example 1: Video/Audio Follow

Virtual video input 1 tied to virtual video output 8 and virtual audio input 1 tied to virtual audio output 8 enables the video and audio (a football game?) from a Satellite Receiver to be seen and heard with a monitor.

### Example 2: Video/Audio Breakaway

Virtual video input 1 tied to virtual video output 8 and virtual audio input 4 tied to virtual audio output 8 enables the video (a football game?) to be seen while listening to a CD. This is a typical breakaway audio example.

### Example 3: Video/Audio Breakaway

Virtual video input 1 tied to virtual video output 8 and virtual audio input 32 tied to virtual output 8 enables the video (a football game?) to be seen while listening to a stereo radio. This example demonstrates breakaway audio using an unassigned audio input.

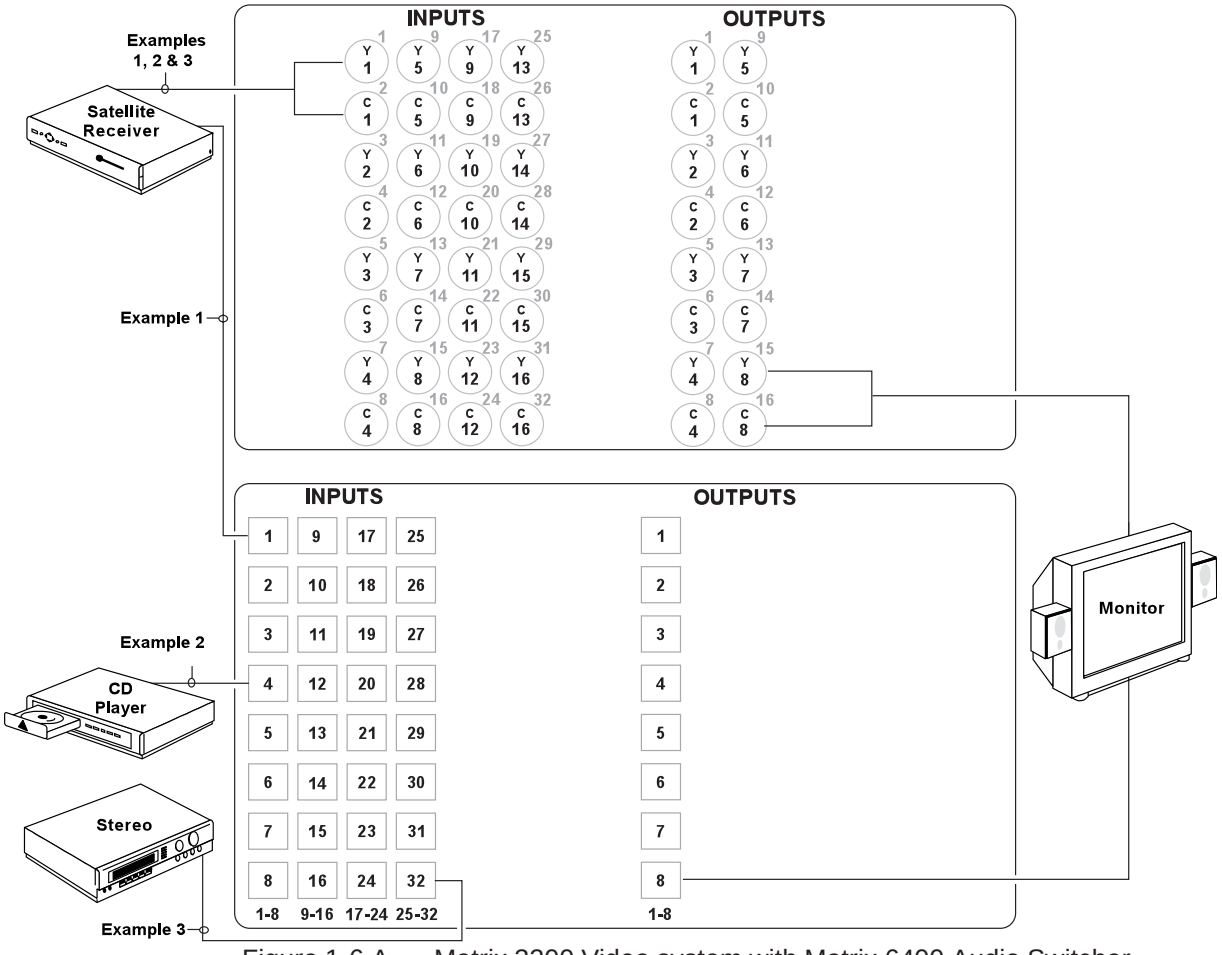



Figure 1-6.A Matrix 3200 Video system with Matrix 6400 Audio Switcher.

# Matrix 3200/6400 Video Switcher Specifications

## Video input

| | |
|---|---|
| Number/signal type | Up to 32 or 64 (varies with configuration) RGsB, RsGsBs, component video, S-video, composite video, HDTV |
| Connectors | BNC female (quantity varies with model) |
| Nominal level | Analog ..... 1V p-p |
| Minimum/maximum level(s) | Analog ..... 0.5V to 1.5V p-p |
| Impedance | 75 ohms |
| Return loss | –30dB @5 MHz |
| External sync (genlock) | 0.3V to 12V p-p, 75 ohms |

## Video throughput

| | |
|---|---|
| Routing | 16 x 8 or larger matrix up to 32 x 32 or 64 x 64, depending on model and configuration |
| Gain | Unity |
| Bandwidth — Matrix 6400 | Minimum ..... 80 MHz (–3dB), fully loaded |
| | Maximum ..... 150 MHz (-3dB), fully loaded |
| | 0–10 MHz ..... No more than +0.1dB to -0.1dB |
| | 0–30 MHz ..... No more than +0.5dB to -0.5dB |
| Crosstalk | > 65dB @ 20 MHz<br>> 80dB @ 60 MHz |
| Switching speed | 200 nS (max.) |

## Video output

| | |
|---|---|
| Number/signal type | Up to 32 or 64 (varies with configuration) RGsB, RsGsBs, component video, S-video, composite video, HDTV |
| Connectors | BNC female (quantity varies with model) |
| Nominal level | 1V p-p |
| Impedance | 75 ohms |
| Return loss | –40dB to input section 3.58 MHz/4.43 MHz |
| DC offset | ±10mV maximum |
| Switching type | Vertical interval |
| Slew rate | >200V/mS |

## Control/Remote — switcher

| | |
|---|---|
| Serial control port | RS-232 or RS-422, 9-pin female D connector |
| Baud rate and protocol | 9600 , 8-bit, 1 stop bit, no parity |
| Pin configurations | 2 = TX, 3 = RX, 5 = GND |
| System intercommunications | 2 RJ-11 connectors |
| Remote keypad control | 2 5 mm, 5-pin captive screw connectors |
| Program control | Extron's control program for Windows®<br>Extron's Simple Instruction Set™ — SIS™ |

## General

| | |
|---|---|
| Power | 100VAC to 240VAC, 50/60 Hz; internal, auto-switchable |
| Matrix 6400 video | 90 watts at 115VAC, 60 Hz |
| Matrix 3200 video | 40 watts at 115VAC, 60 Hz |
| Temperature/humidity | Storage –40° to +158° F (–40° to +70° C) / 10% to 90%, non-condensing<br>Operating +32° to +122° F (0° to 50° C) / 10% to 90%, non-condensing |
| Rack mount | Yes |
| Enclosure type | Metal |

| | |
|---|---|
| 5U dimensions ..... | 8.75" H x 19.0" W* x 14.0" D<br>22.2 cm H x 48.3 cm W* x 35.6 cm D<br>*17.0” (43.18 cm) W excluding rack ears |
| 7U dimensions ..... | 12.25” H x 19.0” W* x 14.0” D<br>31.1 cm H x 48.3 cm W* x 35.6 cm D<br>*17.0” (43.18 cm) W excluding rack ears |
| Shipping weight | |
| Matrix 6400 ..... | 34 lbs. (15.3 kg) |
| Matrix 3200 ..... | 31 lbs. (14.0 kg) |
| Vibration ..... | NSTA 1A in carton (National Safe Transit Association) |
| Listings ..... | UL, CUL |
| Approvals ..... | CE, FCC Class A |
| MTBF ..... | 30,000 hours |
| Warranty ..... | 3 years parts and labor |

*Specifications are subject to change without notice.*

*Notes*

2

# Chapter Two
# Installing the Matrix 3200/6400 Video Switcher

*Installing the Matrix 3200/6400 Video BME*

*Installing the Software*

*BME Cabling*

## Matrix 3200/6400 Video Switcher Installation

Extron recommends that the following steps be done in the order listed to install a Matrix 3200/6400 Video BME.

1. Installing the Matrix 3200/6400 Video BME. (Page 2-1)
2. Set the BME address numbers (0 - 5). (Page 2-2)
3. Connect the BME COMM interconnecting cable(s). (Page 2-2)
4. Connect the RS-232/RS-422 cable to BME #0's serial port. (Page 2-2)
5. Connect the external vertical interval sync cables (Page 2-2)
6. Connect the AC Power cable(s) to the BME(s). (Page 2-2)
7. Apply AC power to the BMEs and Verify Normal Power-Up. (Page 2-2)
8. Load the Matrix 1000 System Virtualization/Control Software. (Page 2-3)
9. Virtualize the Matrix 3200/6400 switcher/system if required. (Page 3-1)

The numbered procedures that follow match the steps above.

### 1. Installing the Matrix 3200/6400 Video BME

The Matrix 3200/6400 Video BME may be a stand-alone video switcher or it may be part of a Matrix 6400/3200 System. In either case it may be installed in a rack. If it is part of a Matrix 6400/3200 System, BMEs may be separated by up to 12 feet and rack mounting is NOT required. If the BMEs are to be rack mounted, they may mounted in any order within a rack or cabinet. The limiting factor is the BME COMM interconnecting cable length which is 12 feet maximum. There are no restrictions to the order in which BMEs may be mounted relative to each other. Logically, the BME addresses in a system such as the one shown in Figure 2-1.A (3 Matrix 3200/6400 Video BMEs above a Matrix 6400 Audio BME) would be set to 0 - 3 sequentially from top to bottom, however, a different order is acceptable and will not impact system operation in any way (see restrictions below).

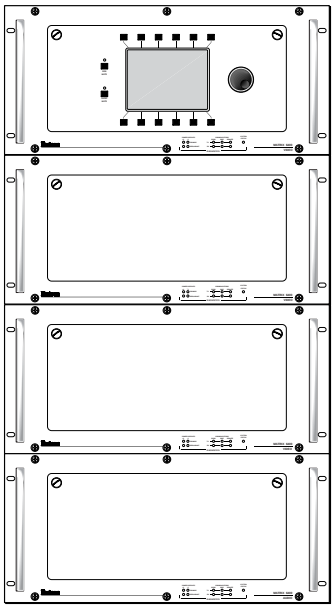


Figure 2-1.A

The location of the equipment within a room should be given careful consideration. Poor planning, with the number of cables involved, could result in a cluttered appearance. Power requirements and the amount of heat exhaust from the system should be taken into consideration.

The following restrictions apply to installing BMEs.

- One BME must be assigned as BME #0.
- BME #0 cannot be a Sync module.
- A BME with an FPC 1000 Front Panel Controller must be BME #0.
- Address assignments must not skip numbers.
- Address assignments of 0 - 5 are accepted, BMEs w/address 6-9 are ignored.
- A system is limited to one audio module.
- A system may NOT include both Wideband video and Low Resolution video modules.

### 2. Setting BME Addresses

Each BME must be set to a unique address of 0 - 5 using a push-button switch located on the rear panel (see Figure 2-2.B, Item 1). BME #0 will be the Main Controller and may be any module except the Sync module.

### 3. Connecting the BME COMM interconnecting cable(s)

Figure 2-2.A
RJ-11 Cable

If there is more than one BME, the BME COMM connectors must all be connected together in daisy chain fashion using Extron supplied RJ-11 telephone cable (Figure 2-2.A). The chain begins at the BME COMM OUT connector of BME #0 (See Item 2 in Figure 2-3.A) and connects to the BME COMM IN connector of the closest BME, that BME's BME COMM OUT connector is then connected to the next closest BME if necessary. Repeat this process until all BMEs are connected (No BME will have two empty BME COMM connectors).

### 4. Connecting the RS-232/RS-422 Cable to BME #0

Connect the cable from the Host PC computer serial port to the RS-232/RS-422 connector on the rear panel of BME #0 as shown in Figure 2-3.A on the next page (Item3). After the BME(s) have been virtualized, they can be controlled through this connection using a PC Host or from a touch screen or any other user-supplied controlling device, such as AMX, Crestron, etc., that is capable of generating the proper commands.

### 5. Connecting the External Vertical Interval Sync Cables

Matrix 3200/6400 video switchers can use an external sync signal during the vertical interval. The required external sync signal is essentially a composite sync signal from a black burst generator or a time base corrector. The illustration to the right shows the sync connections. The IN connector receives the external sync timing signal. The OUT connector allows the signal to be passed on to another video device if required.

If there is no external sync, the switcher will switch inputs at any time during the vertical scan.

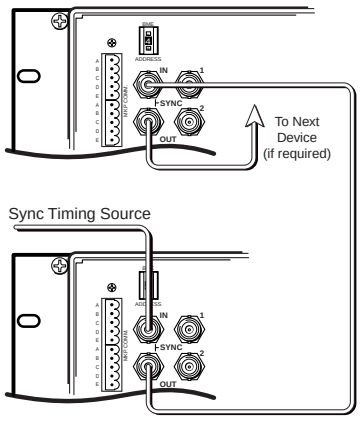



Figure 2-2.B

### 6. Connecting the AC Power Cable(s) to the BME(s)

Each BME has its own internal power supply. Connect an AC Power cord to the AC power receptacle on each BME (Item 4 in Figure 2-3.A). Connect the power cord plug to an AC power source.

### 7. Applying AC Power to the BME(s)

Each BME has a power ON/OFF toggle switch on the rear panel just above the AC power cord receptacle. BME #0 must be powered ON at the same time or after all other BMEs are ON. Press each power switch to the ON (1) position, Go to 7A on Page 2-3.

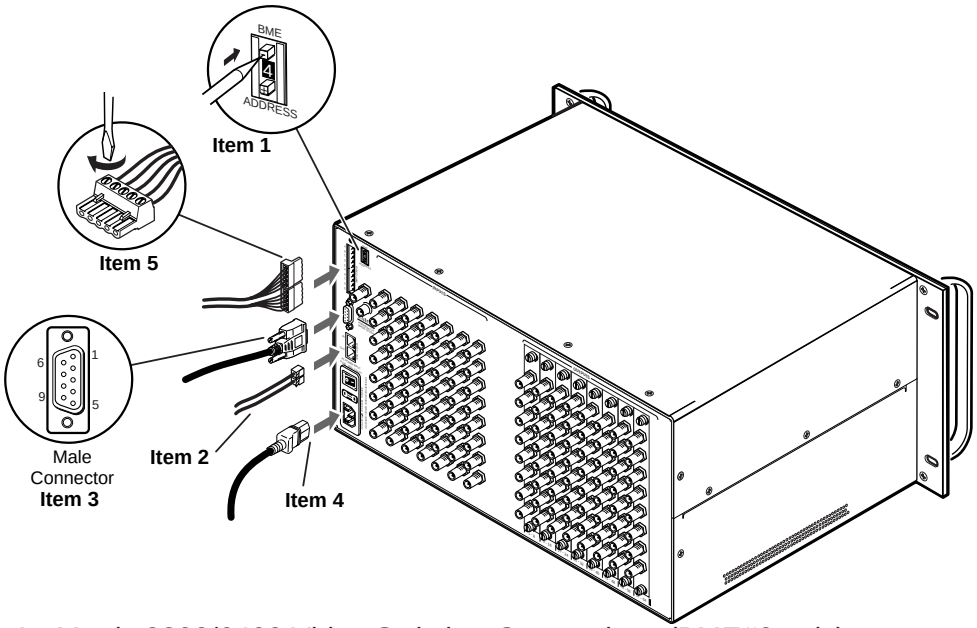



Figure 2-3.A Matrix 3200/6400 Video Switcher Connections (BME#0 only)

### 7A. BME Power-Up Verification

The Diagnostics LEDs shown in Figure 2-3.B are located on the front panel of the Matrix 3200/6400 Video BME. The normal state of the LEDs after power-up is Primary +V and -V LEDs ON. If the BME includes a Redundant power supply, the Redundant +V and -V LEDs will also be ON. If the Primary power supply fails, its LEDs will be OFF and the Redundant LEDs will blink.

The System Status LED will initially blink indicating that internal housekeeping is occurring, when it goes solid ON, the system is ready.

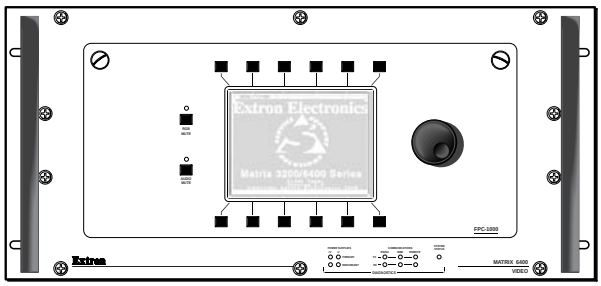
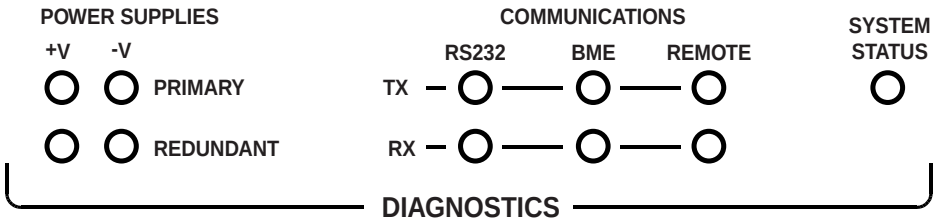



Figure 2-3.B



## 8. Installing the Matrix 6400/3200 Virtualization/ Control Program Software

The Matrix 6400/3200 Virtualization/Control Program (Extron part number 29-036-01) , which is used by the Matrix 6400, is compatible with Windows 95/98/2000, and NT. It provides tools for initial setup of the system and remote control of various functions including input to output ties, audio gain, muting, recalling and saving presets, etc.

**NOTE** *If your Matrix 3200/6400 switcher was previously set up for RS-232, and your PC comm port uses RS-422, the switcher must be changed to match the PC interface. The procedure for making the change begins on Page 5-1.*

The program is contained on a set of 3.5-inch diskettes. To install the program from the floppy disk to the hard drive, run SETUP.EXE from the floppy disk and follow the instructions that appear on the screen. The program occupies approximately 3 MB (megabyte) of hard-drive space.

Matrix 6400
Control Pgm

By default, the Windows installation creates a C:\MTRX6400 directory, and it will place two icons (MTRX 6400 Control Pgm and MTRX 6400 Help) into a folder named "Extron Electronics".

### Purpose of installing the software

The Matrix 3200/6400 Video Switcher must first be virtualized before starting any operations. Installing the Matrix 6400/3200 Virtualization/ Control Program is the first step towards system virtualization. See Step 9 below for virtualization instructions.

Optionally, using normal Windows controls, you can perform many of the same adjustments as from the front panel.

For information about program features, you can access the help program in any of the following ways:

Matrix 6400
Help

- From the Extron Electronics program folder, double-click on the Matrix 6400 Help icon (shown at the left).
- From within the Matrix 6400 Control Program, click on the Help menu on the main screen.
- From within the Matrix 6400 Control Program, press the F1 key.

## 9. Virtualizing the Matrix 3200/6400 Switcher/System

Detailed virtualization instructions begin on Page 3-1.

## 10. Matrix 3200/6400 Video Input/Output Cabling

Using work-sheets and/or printouts from the Matrix 6400 Control Program, install video input/output cables as required.

### Adapters

An RCA male to BNC female adapter (see Figure 2-4.B) enables input and/or output devices with RCA style connectors to use high resolution cables with BNC connectors to connect to the Matrix 3200/6400 Video Switcher. Extron does not currently offer an adapter of this type but it can be purchased at many electronics parts suppliers.

Figure 2-4.A

An S-Video male to dual BNC female adapter (see Figure 2-4.C below) enables input or output devices with S-Video connectors to use high resolution cables with BNC connectors to connect to the Matrix 3200/6400 Video Switcher. The Extron part number for this adapter is 26-353-01.

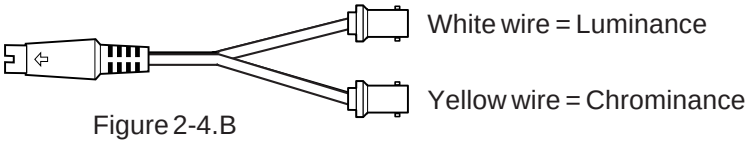


Figure 2-4.B

*Notes*

3

# Chapter Three

## Using the Matrix 3200/6400 System Virtualization/Control Software

## Extron's Matrix 3200/6400 System Virtualization/Control Program

The Matrix 3200/6400 System Virtualization/Control program communicates with the Extron Matrix 3200/6400 System through the RS-232/422 port on BME #0 (defaults to 9600 baud, 8 bit, 1 stop, no parity). The program is required to initially set the *Virtualization* and optional *Room* configurations for the system. See the following two sections for details:

- System Virtualization - creating a virtual I/O switching System - *(see Page 3-2)*
- Rooming - how to create Rooms - *(see Page 3-4)*

The program also presents all the functions found on the optional Front-Panel Controller (FPC 1000), but in an interactive graphical interface, so it may be used for full control or initial programming of the system. Because settings to the Matrix (Ties, Presets, Audio config) are stored in the unit's memory, several modes of 'programming' are possible. It provides 4 major methods:

- Remote control and programming of the system in real time through the RS-232 port.
- Saving system's settings for later restoration to the same system (backup) or copying to (programming) another system. Multiple configurations (programs) can be saved to disk and any one quickly reloaded later, providing an unlimited number of possible setups.
- Creating Program byte-strings for application to the Matrix system through a third-party control system.
- Emulation (off-line) programming of the system's settings for copying to system at a later time or another place. Emulation mode also allows creation of programs for any possible Matrix hardware configuration without being connected to such a system.

To load a demonstration set of Ties, Presets and Rooms to your Matrix (or Emulate one) Restore from the DEMO6400.MTX file which was installed with the Windows Software. Use NEW.INI to clear all settings in a unit.

Note that pressing F1 from within the program will provide context-sensitive Help.

## An Explanation of VIRTUAL I/O SWITCHING in the Matrix 3200/6400 System

A Matrix 3200/6400 System consists of from 1 to 6 Switcher boxes (BMEs), each of which may have as many as 64 inputs and 64 outputs. It is usually desirable to have certain inputs (or outputs) switch together as a set: to *Follow* each other. For example, if the system hardware consisted of a 64 x 64 Video BME and a 64 x 64 Audio BME, you'd want your Video monitor's image and its Audio speakers to be coming from the same source (maybe a VCR) and to follow each other when switched to another source (perhaps a Laser Disc player). This type of switching requires the two BMEs to communicate with each other so that they both switch to the correct inputs to create the *follow* condition. In the traditional and simplest configurations, hardware is usually designed to cause both BMEs to switch to the same input (or output) number.

An example where Follow mode is *always* required is with S-Video where the 'Y' signal and the 'C' signal must be switched as a pair of input signals and a pair of output signals Again, traditional hardware does this by causing the paired signals to follow each other, either in a single box that is made only for S-Video or by using two boxes designed for Composite Video and forcing them to follow each other by switching to the same input (or output) number. Wouldn't it be nice to have a single Video switcher box that can be field-programmed to be either an S-Video or Composite Video switcher? This is what Extron's Virtual I/O

Switching does; it groups physical input connectors and physical output connectors together into *Virtual Inputs* and *Virtual Outputs*, each of which switches from 1 to 6 *Virtual Planes.*

Let's carry the S-Video example a step further using the 64 x 64 Video BME and a 64 x 64 Audio BME. If we can *map* (logically split) the first box into a 'Y' plane and a 'C' plane and the second box into an 'Audio' plane, we will have created a system with 32 Virtual Inputs and 32 Virtual Outputs in 3 Virtual Planes. [The 32 comes from splitting the 64 x 64 Video box into two halves]. In this example, half of the Audio box would not be included in the Virtual map since we only need 32 of the 64 ports and we'd be better off using a 32 x 32 Audio BME for this configuration. Or, using the same hardware, we could map the first box as 'Composite Video' and the second into an 'Audio' plane again to create a system of 64 Virtual Inputs and 64 Virtual Outputs in 2 Virtual Planes. Or, we could map the first box into 'Component Video' with a 'R-Y' plane, a 'B-Y' plane, and a 'Y' plane and the second into an 'Audio' plane again to create a system of 21 Virtual Inputs and 21 Virtual Outputs in 4 Virtual Planes. [The 21 comes from splitting the 64 x 64 Video box into three parts]. All three of these configurations are made with the same two BMEs merely by loading the appropriate Virtual Map into the Matrix 3200/6400 system's memory.

Note that the number of Virtual Planes tells you how many physical input (or output) connectors will be switched together for each Virtual Input (or Output) switched. In the 21 x 21 x 4 Component Video with Audio virtual system example, the first BME might have physical inputs 1, 2, and 3 as Virtual Input 1 and 4, 5, and 6 as Virtual Input 2, etc. The Audio BME would have physical input 1 as Virtual Input 1, 2 as 2, etc.

The Windows Virtualization/Control Program is used to create and load the Virtual Map to the Matrix 3200/6400 system as described in the Creating a Virtual I/O Switching System (Map) for the Matrix 3200/6400 System section.

## Creating a VIRTUAL I/O SWITCHING SYSTEM (MAP) for the Matrix 3200/6400 System

The following steps use the Windows Virtualization/Control Program to create a Virtual I/O Switching System (click here for definitions) within the physical hardware by generating and loading a *map* to the Matrix 3200/6400 hardware. A physical Matrix 3200/6400 System consists of from 1 to 6 Switcher boxes (BMEs), each of which may have as many as 64 inputs and 64 outputs. After determining what type and sizes of switcher hardware exists in the matrix, the program will generate a 'virtual system' consisting of from 1 to 64 *Virtual Inputs,* and 1 to 64 *Virtual Outputs*, in 1 to 6 *Virtual Planes.*

- Ensure that all BME's that will be part of the system have been connected to each other and their BME numbers have been set correctly. Establish an RS-232 connection between the PC and BME #0 of the Matrix 3200/6400 System. Start the MTRX6400 program (under Windows) and click on the corresponding **COMM PORT** number when asked (Figure 3-2.A). Click **OK**, or.....

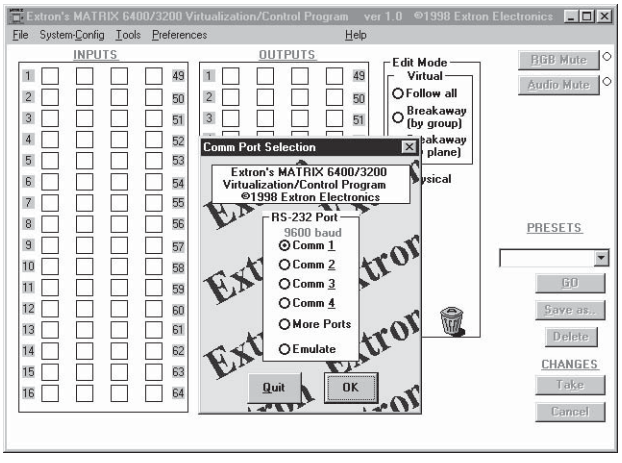



FIGURE 3-2.A

If you wish to program a system without being connected to it at this time, click on **EMULATE**. Follow steps in How to Off-Line (Emulate) Program the Matrix.

- The program will communicate with the Matrix 3200/6400 System to determine its hardware configuration (type and size of each connected BME). It then reads the system's settings (Ties, Presets, Virtual Map, etc.) and draws a graphical representation of the unit's configuration and settings (Ties) on the Main screen (Figure 3-5.A & B). It also reads the MTRX6400.INI file (saved from last session) to draw Icons for each I/O (if any had been applied in previous programming sessions) to make the graphical representation even more friendly.

  NOTE: If this is a new system that has not been virtualized yet or one that has had its map cleared, the graphical representation and all information shown on the Virtual Map screen may be invalid at this time.

- From the menu on the Main screen, click SYSTEM-CONFIG to show the Virtual Map screen (see Figure 3-4.A). From the Virtual Map screen menu, click **CONFIGURE|PHYSICAL SWITCHERS** to show the Physical Configuration screen (Figure 3-3.A). Examine this screen to ensure that all BMEs were seen and their type and size is being reported as expected. Click on the '**Close**' button to return to the Virtual Map screen.

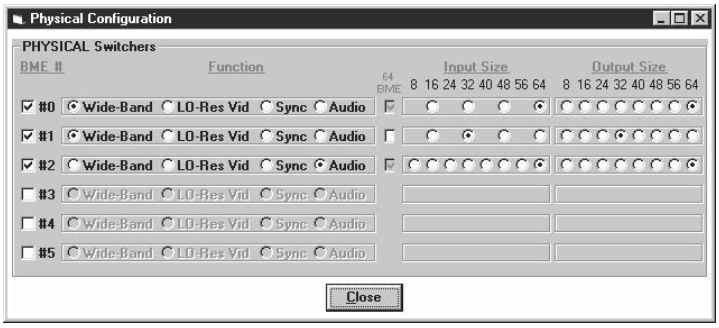


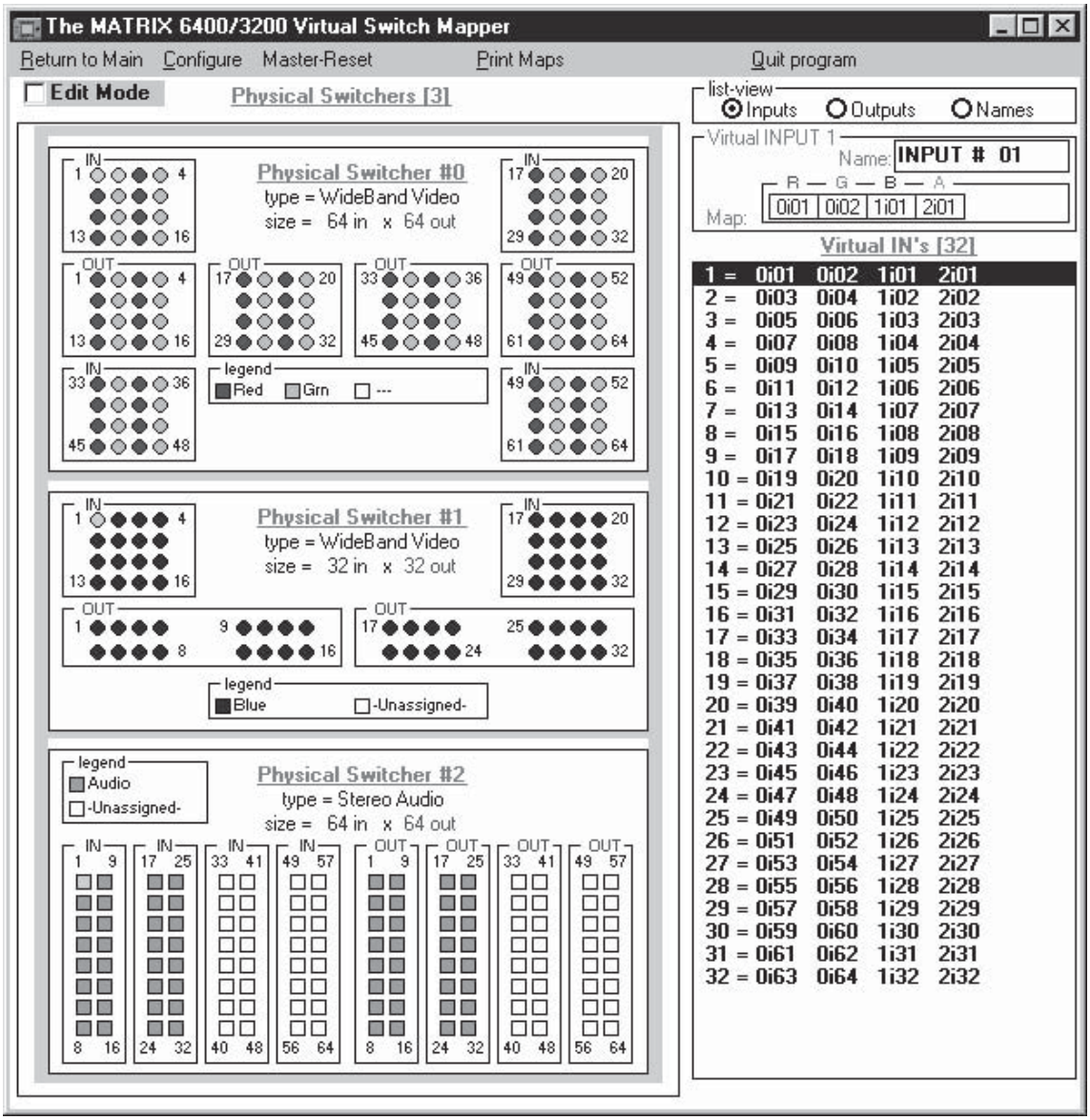

FIGURE 3-3.A

- From the Virtual Map screen menu, click **CONFIGURE|VIRTUAL SWITCHER** to show the Virtual Configuration screen. This screen shows how the physical system will be *mapped* into a virtual system switcher by the Windows program (see Figure 3-4.B). You may need to make some choices at this time that affect how many virtual planes will be created and how many virtual inputs and outputs will exist. For example, if a Sync BME was found, the program needs you to decide whether to use composite sync (1 plane) or separate H and V sync (2 planes).

  You need to decide how you want the initial map assignments organized, whether as 'Repeat-Pattern' (e.g. RGBRGB..B) or 'Group-by-Plane' (e.g. RRRRGG..BBB). You may also change the ordering of the planes with this screen and affect which physical connectors get which signals. For example, in a Wideband system, instead of being in RGB order, you can change it to BGR order by using the radio buttons in each plane's choices.

  Note that you may play with the settings in this screen without causing any changes to the system's map until you press the '**OK**' button. Even after committing the changes and viewing them in the Virtual Map screen, you can still return to this Virtual Configuration screen later and virtualize the system differently. Changes can be made freely UNTIL you begin to make ties, save presets, create rooms, or name your virtual inputs and outputs because the number of virtual inputs and outputs may be changed by re-virtualizing. Click on the '**OK**' button to return to the Virtual Map screen.

- In the Virtual Map screen, examine the physical layout of the BMEs and how the virtualization process assigned the input and output connectors to various planes. You can return to the Virtual Configuration screen if you wish to change the mapping at this time by clicking **CONFIGURE|VIRTUAL SWITCHER** again. If the map looks correct, you may optionally assign names (up to 12 characters long) to any of the virtual inputs or outputs from the Virtual Map screen at any time. Names can also be read and edited from the system's front panel controller, if present.


The MATRIX 6400/3200 Virtual Switch Mapper
Return to Main
Configure
Master-Reset
Print Maps
Quit program
Edit Mode
Physical Switchers [3]
list-view
Inputs
Outputs
Names
Virtual INPUT 1
Name: INPUT # 01
R — G — B — A
Map: 0i01 0i02 1i01 2i01
Virtual IN's [32]
1 = 0i01 0i02 1i01 2i01
2 = 0i03 0i04 1i02 2i02
3 = 0i05 0i06 1i03 2i03
4 = 0i07 0i08 1i04 2i04
5 = 0i09 0i10 1i05 2i05
6 = 0i11 0i12 1i06 2i06
7 = 0i13 0i14 1i07 2i07
8 = 0i15 0i16 1i08 2i08
9 = 0i17 0i18 1i09 2i09
10 = 0i19 0i20 1i10 2i10
11 = 0i21 0i22 1i11 2i11
12 = 0i23 0i24 1i12 2i12
13 = 0i25 0i26 1i13 2i13
14 = 0i27 0i28 1i14 2i14
15 = 0i29 0i30 1i15 2i15
16 = 0i31 0i32 1i16 2i16
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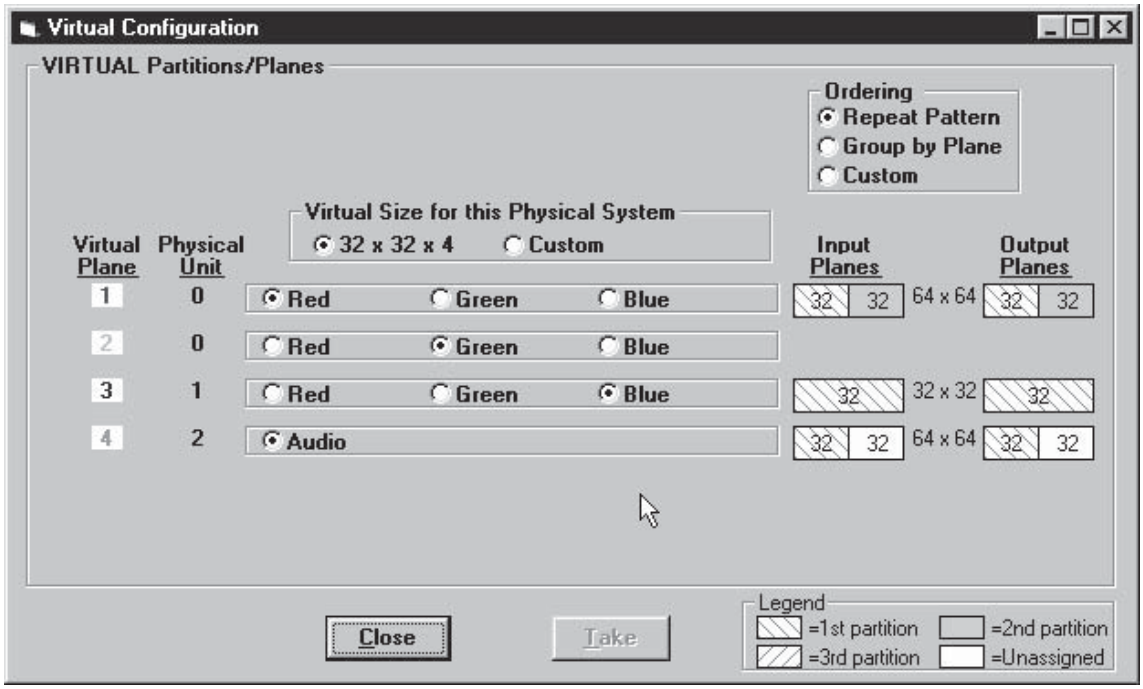
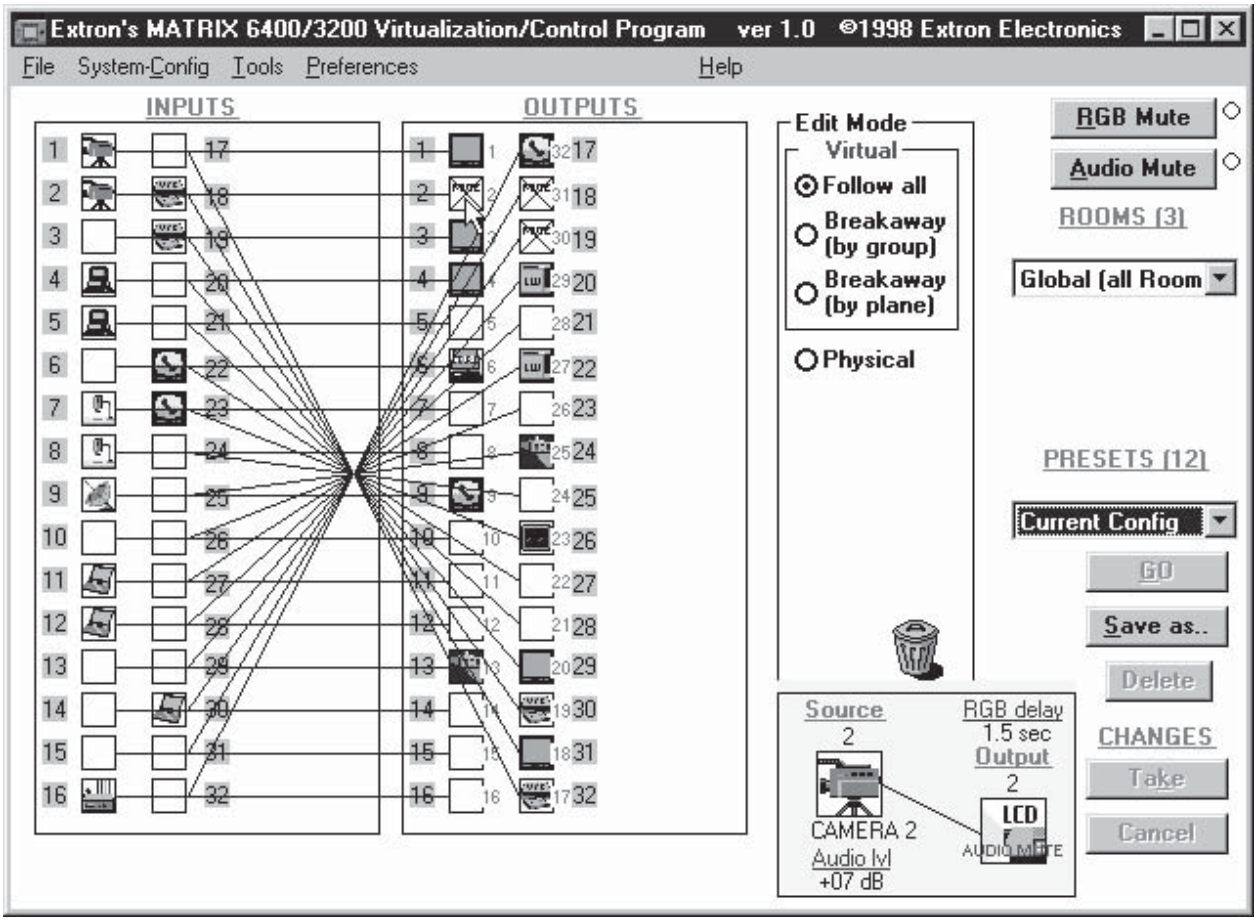
22 = 0i43 0i44 1i22 2i22
23 = 0i45 0i46 1i23 2i23
24 = 0i47 0i48 1i24 2i24
25 = 0i49 0i50 1i25 2i25
26 = 0i51 0i52 1i26 2i26
27 = 0i53 0i54 1i27 2i27
28 = 0i55 0i56 1i28 2i28
29 = 0i57 0i58 1i29 2i29
30 = 0i59 0i60 1i30 2i30
31 = 0i61 0i62 1i31 2i31
32 = 0i63 0i64 1i32 2i32
Physical Switcher #0
type = WideBand Video
size = 64 in x 64 out
legend
Red
Grn
---
Physical Switcher #1
type = WideBand Video
size = 32 in x 32 out
legend
Blue
-Unassigned-
Physical Switcher #2
type = Stereo Audio
size = 64 in x 64 out
legend
Audio
-Unassigned-

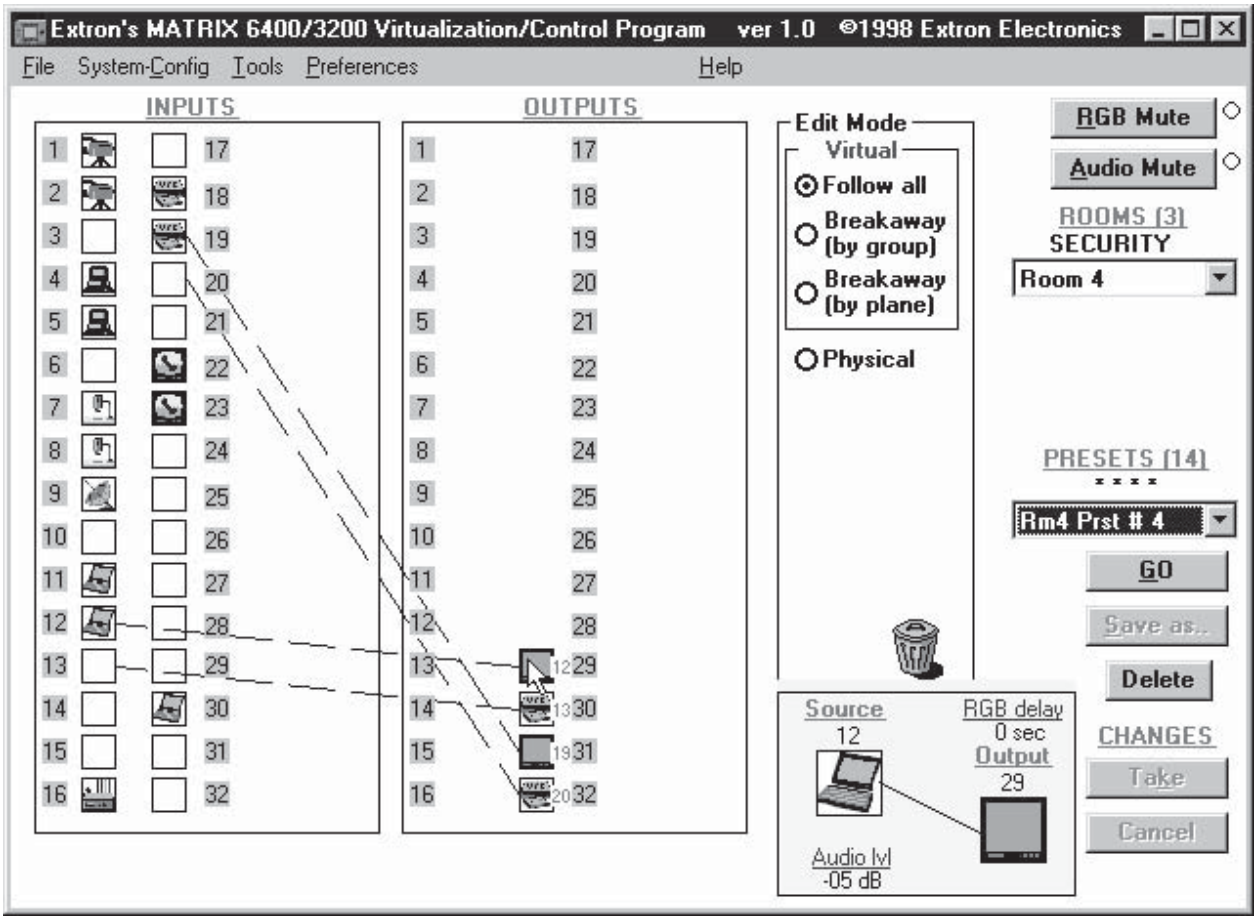
↑FIGURE 3-4.A




↓FIGURE 3-4.B




↑FIGURE 3-5.A Main Screen - Ties




↓FIGURE 3-5.B Main Screen - Presets

- If you wish to group certain virtual outputs together so that you may later create Room Presets, now would be a good time to Create ROOMS by clicking **CONFIGURE|ROOM CONFIGURATION**.
- You can create a hard-copy document that shows all the details from the Virtual Map screen at any time by clicking the **PRINT MAPS** menu. The printed maps make a very handy wiring guide and will appear in color if using a color printer. You can specify which printer to use from the **FILE|SELECT PRINTER** menu in the Main screen.
- From the Virtual Map screen menu, click **RETURN TO MAIN** and note that the number of input and output boxes shown on the Main screen matches the number of virtual input and virtual outputs created by the virtualization. The virtualization of the system is now complete and the map has been stored in BME #0. Unless the map gets destroyed or needs to be regenerated because of a system hardware reconfiguration (size, type, or number of BMEs changes) or you wish to change the virtual configuration, there is no requirement to use the Windows Virtualization/Control software. You can, however, continue to use it to control and program (set Ties, Presets, etc.) the system at any time.

## How to Create ROOMS within the Matrix 3200/6400 System

The following steps use the Windows Virtualization/Control Program to optionally define *Rooms* in the Matrix 3200/6400 system. A Room is a group of virtual outputs that are logically associated with each other, probably by location (such as 3 video monitors and a VCR all located at a building's security desk). A Room consists of from 1 to 16 virtual outputs and the Matrix 3200/6400 supports up to 10 Rooms. Each Room can have a name (for user friendliness, up to 12 characters long) and up to 10 Presets assigned to it (for a total of 100 Room Presets). Unlike the 32 Global Presets, Room Presets only affect those virtual outputs associated with that Room and do not change any other connections in the Matrix, making the use of Presets much more simple and flexible. Room Presets are particularly useful in conjunction with the MKP-1000 keypads. Note: Rooms exist only to support Room Presets.

- Ensure that the System has been Virtualized before creating any Rooms. Establish an RS-232 connection between the PC and BME #0 of the Matrix 3200/6400 System. Start the MTRX6400 program (under Windows) and click on the corresponding **COMM PORT** number when asked (Figure 3-6.A). Click **OK**, or.....

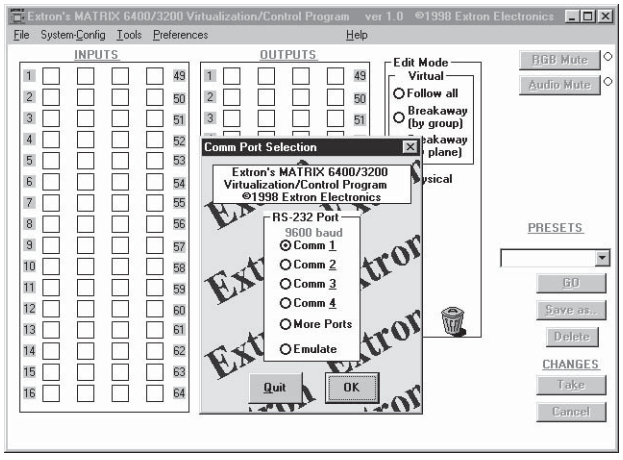



FIGURE 3-6.A

If you wish to program a system without being connected to it at this time, click on **EMULATE**. Follow steps in How to Off-Line (Emulate) Program the Matrix.

- The program will communicate with the Matrix 3200/6400 System to determine its hardware configuration (type and size of each connected BME). It then reads the system's settings (Ties, Presets, Virtual Map, etc.) and draws a graphical representation of the unit's configuration and settings (Ties) on the Main screen. It also reads the MTRX6400.INI file (saved from last session) to draw Icons for each I/O (if any had been applied in previous programming sessions) to make the graphical representation even more friendly.

- From the menu on the Main screen, click **SYSTEM-CONFIG** to show the Virtual Switch Virtual Map screen (Figure 3-4.A). From the Virtual Map screen menu, click **CONFIGURE|ROOM CONFIGURE** to show the Room Mapper screen (Figure 3-7.A). Associate a Virtual Output with a room number by using the mouse to drag the output circle to the list on the right side. You can remove a Virtual Output from a room by dragging the circle to the trash-can. You can add a name to the Room or edit it by typing in the text-box. Click on the '**OK**' button to save your changes or 'Cancel' to abandon your changes. Press '**Close**' to return to the Virtual Map screen.

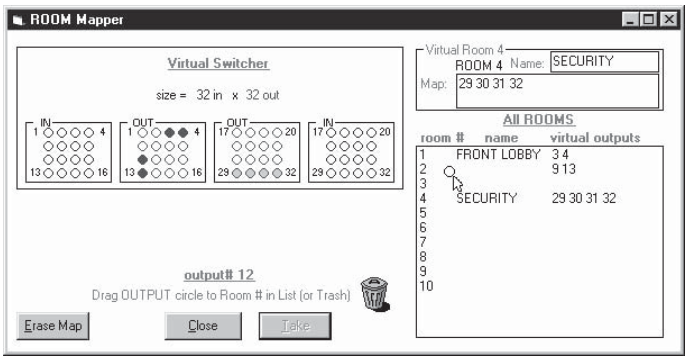


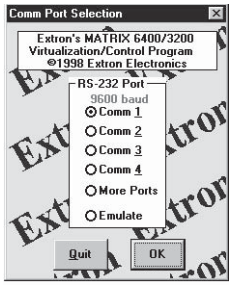

FIGURE 3-7.A

- From the Virtual Map screen menu, click **RETURN TO MAIN** and note that a list-box for the defined rooms should appear below the 'Audio Mute' button. The Room mapping of the system is now complete and the map is stored in BME #0. Unless the map gets destroyed or needs to be regenerated because of a system hardware reconfiguration (size, type, or number of BMEs changes) or you wish to change the room configuration, there is no requirement to use the Windows Virtualization/Control software. You can, however, continue to use it to control and program (set Ties, Presets, etc.) the system at any time.

## How to REMOTE CONTROL PROGRAM the Matrix 3200/6400 System

Because the Matrix 3200/6400 Switchers store their settings in a nonvolatile memory, programming applied to the unit from the Virtualization/Control Program (or the FPC) is remembered in the unit. The Program only needs to talk to the Matrix system long enough to create (program) the settings. You can, however, leave a computer connected (dedicated) to the Matrix for real-time interactive control and monitoring if you wish.

- To control or program the switcher system in real-time, establish an RS-232 connection between the PC and BME #0 of the Matrix 3200/6400 System. Start the MTRX6400 program (under Windows) and click on the corresponding COMM PORT number when asked. Click **OK**, or.....




If you wish to program a system without being connected to it at this time, click on **EMULATE**. Follow steps in How to Off-Line (Emulate) Program the Matrix.

- The program will communicate with the Matrix 3200/6400 System to determine its hardware configuration (type and size of each connected BME). It then reads the system's settings (Ties, Presets, Virtual Map, etc.) and draws a graphical representation of the unit's configuration and settings (Ties) on the Main screen. It also reads the MTRX6400.INI file (saved from last session) to draw Icons for each I/O (if any had been applied in previous programming sessions) to make the graphical representation even more friendly.

  NOTE: If this is a new system that has not been virtualized yet or one that has had its map cleared by a System Reset, the graphical representation and all information shown on the Virtual Map screen may be invalid at this time.

- Initially, the "Current configuration" from the Matrix is shown. Notice How the Ties Appear as solid lines in various colors here and How the I/O Ports are Grouped and Titled. Selecting a Preset (if any exist) from the Presets List at the

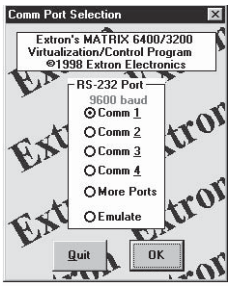
right side of the screen will cause that configuration to be read from the Matrix and drawn on the screen. The displayed preset becomes the "Current configuration" by clicking the **GO BUTTON**.

- You can Add and Erase Ties (edit) when in the "Current configuration". These edits are made using the mouse in a drag and drop operation. To add a Tie, drag the input box and drop it on the desired output box (left to right). To erase a Tie, drag the output box and drop it on the desired input box (right to left). Note that an output can be rerouted to a different input by merely adding the new connection (without erasing the old Tie). You can also erase all Ties that appear on a box by dragging that box to the trash-can. Other settings will affect how the Tie changes are applied: the Hold/Verify versus Immediate settings in the Preferences menu. Hold/Verify (the default) shows Adds and Erases as dotted lines until committed (Take Button) or cancelled (Cancel Button).
- After you have edited the "Current settings", you can also store the configuration as a Preset using the Save As.. Button.
- You can assign a Device icon and a Caption to any of the I/O port boxes for your convenience in operating the Control Program using the Devices Palette To access the Devices screen, use the mouse to click on the desired I/O port box or click the **TOOLS|ASSIGN-DEVICE-ICONS** menu. Your setting of the Icons are remembered by the program (NOT by the Matrix) for your convenience in your next editing session.
- If you have edited any of the configurations or assigned Icons or Captions, when you exit the program you will be prompted to save the changes. These will be written to the MTRX6400.INI file for use in your next editing session (if you agree). The information in the file also allows you to fully restore a Matrix 3200/6400 System to all the settings (Ties, Presets, etc.) from the current session. We strongly recommend you allow the program to save your changes! You may also wish to Save the unit's settings in a uniquely named file, instead.

## How to OFF-LINE (Emulate) PROGRAM the Matrix 3200/6400 System

The Matrix Control Program provides an "Emulate" mode to allow you to build and save a configuration file, off-line, without being connected to a Matrix System. This file can later be downloaded (programmed) into a Matrix via the RS-232 port using the Matrix 3200/6400 Virtualization/Control Program. The Emulate mode also allows you to generate the RS-232 strings needed to interface a third party control system to a Matrix System instead of downloading it with the Virtualization/Control Program. Finally, the Emulate mode allows "programming" for a hardware configuration that differs from your present system.

- To program a switcher without being connected to it at this time, start the MTRX6400 program (under Windows) and click on **EMULATE** (instead of a COMM PORT number) when asked. Click **OK**.




- The program will ask for 2 file names. The first is for restoring the settings to an existing configuration (as though a Matrix with that configuration and presets were connected). Typical choices for this would be MTRX6400.INI (to edit the last real-time configuration) or DEMO6400.MTX (to view some possibilities) or NEW.INI (to start from an empty configuration). This first file is read by the program (and will not be altered) and is optional: you can choose **CANCEL** instead of specifying a name if you wish. The second file is required and will be created to save the results of editing in the Emulation mode. It is this file that you would later use for downloading to the Matrix. You should give this file a meaningful name (i.e. JOB1107.MTX). If the second file already exists, you'll be warned that you are about to overwrite it.

- A typical Emulation operation might consist of multiple editing sessions:
- Session A (connected to a Matrix 3200/6400 System)
- Session B (Emulation) use MTRX6400.INI as the first file (source) to edit the last save from the Matrix

  use JOB1107.MTX as the second file (destination)
- Session C (Emulation) use JOB1107.MTX as the first file (source) to further edit the last Emulation save

  use JOB1107.MTX as the second file (destination)
- Session D (connected to a Matrix 3200/6400 System)
  Restore from JOB1107.MTX to program the System from the saved Emulation
- The program will show the Physical Configuration screen using the parameters read from the source file (if you specified one). Change the settings as needed and then click **TAKE**.
- The program reads the emulated settings (Ties, Presets, Virtual Map, etc.) and draws a graphical representation of the system's configuration and settings (Ties) on the Main screen. It also reads the source file to draw Icons for each I/O (if any had been applied in previous programming sessions) to make the graphical representation even more friendly.
- Initially, the "Current configuration" from the emulated Matrix is shown. Notice How the Ties Appear as solid lines in various colors here and How the I/O Ports are Grouped and Titled. Selecting a Preset (if any exist) from the Presets List at the right side of the screen will cause that configuration to be read from the emulated Matrix and drawn on the screen. The displayed preset becomes the "Current configuration" by clicking the **GO** BUTTON.
- You can Add and Erase ties (edit) when in the "Current configuration". These edits are made using the mouse in a drag and drop operation. To add a Tie, drag the input box and drop it on the desired output box (left to right). To erase a Tie, drag the output box and drop it on the desired input box (right to left). Note that an output can be rerouted to a different input by merely adding the new connection (without erasing the old Tie). Another setting will affect how the Tie changes are applied: the Hold/Verify versus Immediate settings in the Preferences menu. Hold/Verify (the default) shows Adds and Erases as dotted lines until committed (**Take** Button) or cancelled (**Cancel** Button)
- After you have edited the "Current settings", you can also store the configuration as a Preset using the **Save As..** Button.
- You can assign a Device icon and a Caption to any of the I/O port boxes for your convenience in operating the Control Program using the Devices Palette. To access the Devices screen, use the mouse to click on the desired **I/O PORT** box or click the **TOOLS|ASSIGN-DEVICE-ICONS** menu. Your setting of the Icons are remembered by the program (NOT by the Matrix) for your convenience in your next editing session.
- If you have edited any of the configurations or assigned Icons or Captions, when you exit the program you will be prompted to save the changes. These will be written to the Emulation file for use in your next editing session (if you agree). The information in the file also allows you to fully restore a Matrix 3200/6400 System to all the settings (Ties, Presets, etc.) from the current session We strongly recommend you allow the program to save your changes! You may also wish to Save the unit's settings in a uniquely named file, instead.

## How to SAVE and RESTORE the Matrix 3200/6400 Settings

The FILE menu provides the following functions:

- Save MATRIX settings as... (uploads *.MTX file from system)
- Restore MATRIX settings from... (downloads *.MTX file to system)
- Save This Session's settings (uploads MTRX6400.INI file from unit)
- Restore Last Session's settings (downloads MTRX6400.INI file to unit)

In normal operation (non-emulation mode), the Virtualization/Control Program reads the MTRX6400.INI file at start-up to display Icons since these items do not cause any changes in the Matrix System's configuration (programming) and provide convenience to the user. The file actually contains all the information needed to fully Restore (program) the Matrix 3200/6400 System's settings. Both of the Restore functions in the menu cause a FULL Restore of the attached Matrix System, providing an easy method to switch between (reprogram) configurations.

Both of the Save functions in the menu create a complete .INI type file for future restoration to an attached Matrix. By default, the SAVE AS choice uses file extension .MTX, but any name and extension can be used when saving or restoring a file. The SAVE THIS function is not usually needed since the program prompts you to create one upon exiting if any edits were performed. The RESTORE LAST function allows you to set your Matrix configuration back to its settings when you first started the Virtualization/Control Program (effectively cancelling any edits and changes without leaving the program).

## How to Create PROGRAM BYTE STRINGS for the Matrix 3200/6400 System

The Matrix 3200/6400 System can be controlled and programmed through the RS-232 port via third party control systems. These systems need to be "told" what bytes to send to the Matrix to perform this control. The Matrix 3200/6400 User's Manual provides details of how to build these byte strings (using paper and pencil), but the Matrix Virtualization/Control Program can make this job much easier by building the strings for you. To generate the strings:

- Create all the Matrix System settings (program) from either Emulate mode or being connected to a Matrix System. The Program Strings that can be viewed produce the Current-Ties, Presets, Audio-Config, and RGB Delay settings.
- To see the strings, click on the **TOOLS|SHOW RS-232-STRINGS** menu to show the Program Strings screen (Figure 3-10.A).

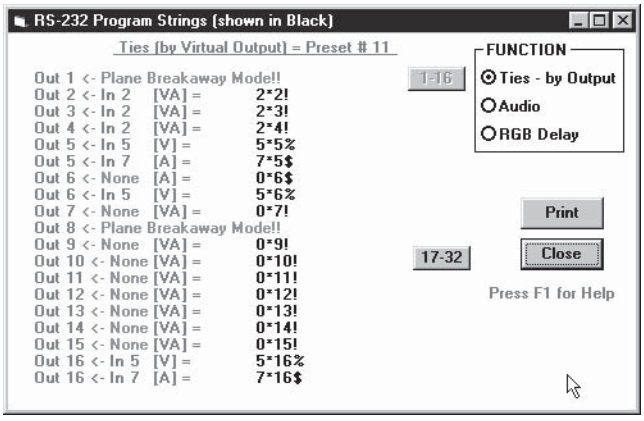

RS-232 Program Strings (shown in Black)
Ties (by Virtual Output) = Preset # 11
Out 1 <- Plane Breakaway Mode!!
Out 2 <- In 2 [VA] = 2*2!
Out 3 <- In 2 [VA] = 2*3!
Out 4 <- In 2 [VA] = 2*4!
Out 5 <- In 5 [V] = 5*5%
Out 5 <- In 7 [A] = 7*5$
Out 6 <- None [A] = 0*6$
Out 6 <- In 5 [V] = 5*6%
Out 7 <- None [VA] = 0*7!
Out 8 <- Plane Breakaway Mode!!
Out 9 <- None [VA] = 0*9!
Out 10 <- None [VA] = 0*10!
Out 11 <- None [VA] = 0*11!
Out 12 <- None [VA] = 0*12!
Out 13 <- None [VA] = 0*13!
Out 14 <- None [VA] = 0*14!
Out 15 <- None [VA] = 0*15!
Out 16 <- In 5 [V] = 5*16%
Out 16 <- In 7 [A] = 7*16$
1-16
17-32
FUNCTION
Ties - by Output
Audio
RGB Delay
Print
Close
Press F1 for Help

FIGURE 3-10.A

*Notes*

# Chapter Four

## RS-232/RS-422 Programmer's Guide

*Serial Communications Port*

*Host to Switcher Series Instructions*

*Commands and Responses*

*Error Codes*

*Switcher Initiated Messages*

## Serial Communications Port

If the Matrix Video Switcher is the Master BME (BME #0), its RS-232/RS-422 connector may be connected to the serial port output of a Host device such as a computer or control panel. Software control of the switcher is made possible by this connection. A Host serial port connection to the RS-232/RS-422 connector of a Matrix Video Switcher is shown in Figure 4-1.A.

*The Matrix Video Switcher is normally configured for RS-232 control. If it is to be used with an RS-422 device, an internal cable must be moved. The procedure for moving the cable begins on Page 5-1.*

The RS-232/422 connector on the Matrix Video Switcher is a 9-pin D female with the following pin assignments:

| Pin | RS-232 | Description | RS-422 | Description |
|---|---|---|---|---|
| 1 | – | not used | Tx(-) | Transmit Data (-) |
| 2 | Tx | Transmit Data | Tx(+) | Transmit Data (+) |
| 3 | Rx | Receive Data | Rx(+) | Receive Data (+) |
| 4 | – | not used | Rx(-) | Receive Data (-) |
| 5 | Gnd | Signal Ground | Gnd | Ground |
| 6 | – | not used | – | not used |
| 7 | – | not used | – | not used |
| 8 | – | not used | – | not used |
| 9 | – | not used | – | not used |

The protocol is 9600 baud, 8-bit, 1 stop bit, no parity and no Flow control.

Details for programming the Matrix Video Switcher from a Host system connected to the RS-232/RS-422 port are covered in this chapter.

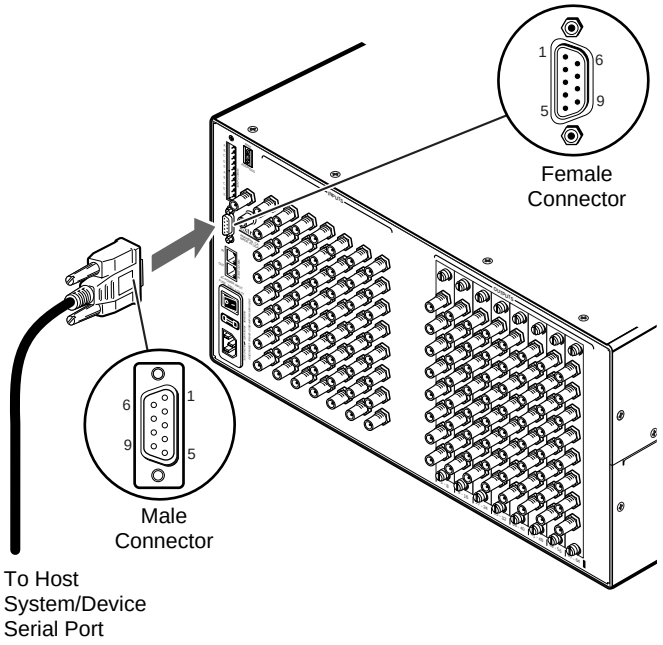



*Figure 4-1.A Matrix Video Switcher RS-232/RS-422 to Host connection.*

## Host to Switcher Communications

The Matrix Video Switcher accepts both Simple Instruction Set and Advanced Instruction Set Commands through the RS-232/RS-422 port. Simple Instruction Set (SIS) commands may consist of one or more characters per command field and do not require any special characters to begin or end the command character sequence. Switcher responses to SIS commands all end with a carriage return and a line feed (CR/LF). An Advanced Instruction Set (AIS) command field begins with an Escape character and ends with a carriage return, line feed is optional (the Switcher Response to an AIS command always ends with a CR/LF).

When the Matrix Video Switcher receives a command (SIS or AIS) and determines that it is valid, it will execute the command and send a response back to the controlling (Host) device. If the switcher is unable to execute the command because it is invalid or contains invalid parameters, it will return an error response to the Host. The error response is coded to help identify the cause of the error. Error code responses are defined on Page 4-8.

When a Matrix Video Switcher local event takes place, such as a Front Panel operation, the switcher responds by sending a message to the Host. These switcher initiated messages are listed on Page 4-8. The switcher does not expect a response from the host, but, for example, the host program may want to request new status.

### Command/Response Table

The Command/Response Table begins on the following page. Lower case characters are acceptable in the command field only where indicated. Symbols are used throughout the table to represent variables in the Command/Response fields. Symbol definitions are shown at the beginning of the table as is an ASCII to Hexadecimal (HEX) conversion table. Error Response codes and switcher generated Unsolicited Responses are shown at the end of the table. Command and/or Response examples are shown throughout the table. Name fields are 12 alphanumeric characters 0 - 9, A - Z (upper and lower case) including "+/-:=" and space.

Commands are split into two groups which are identified by page headers. The two groups are "Simple Instruction Set Commands" and "Advanced Instruction Set and Simple Instruction Set Commands".

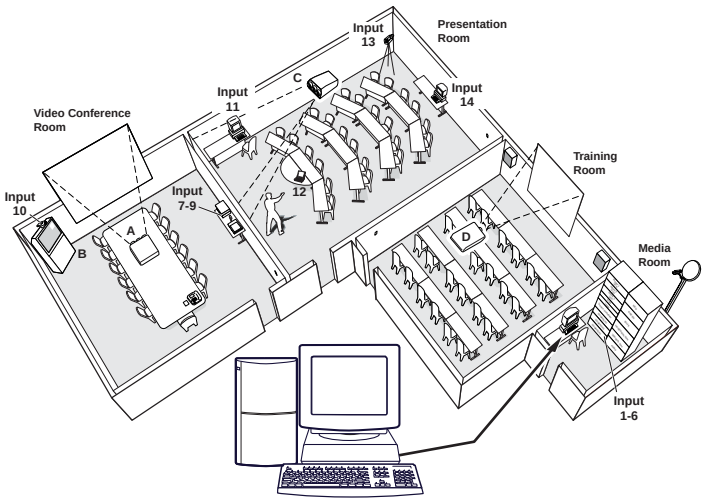



*Figure 4-2.A Host computer controls Matrix 3200/6400 System*

## COMMAND/RESPONSE TABLE

**Symbol Definitions:** [Esc] = Escape ← = CR ↵ = CR/LF • = space

[XA] = 1 thru maximum number of inputs
[XB] = Ø thru maximum number of inputs (Input Ø = muted output)
[XC] = 1 thru maximum number of outputs
[XD] = BME number (Ø thru 5)
[XE] = Ø dB thru 9 dB (audio gain)
[XF] = 1 dB thru 15 dB (audio attenuation)
[XG] = Numerical Value –15 thru +9
[XH] = 1 thru maximum number of rooms [1Ø max.]
[XI] = Ø or 1 (Ø meaning off and 1 meaning on)
[XJ] = Global preset # (Ø = current ties for system in view) [32 max.]
[XK] = Room preset # (Ø = current ties for room in view mode) [1Ø max.]
[XL] = Group Mode (follow). A = All (Follow), B = Aud / Vid / RGB breakaway, C = total breakaway
[XM] = Delay in ½ second increments [1Ø max. = 5.Ø seconds]
[XN] = One digit status of Main and Redundant Power Supplies
Ø = Off or Dead Power supply 1 = No Redundant, using Main Power
2 = Using Redundant Power supply 3 = Has Redundant, using Main Power
[XP] = 1 through maximum number of virtual planes
[XQ] = ØØ through 99 (two digits)
[XR] = (Y)es or (N)o, Y = Mute and N = UnMute for RGB or Audio
[XS] = Controller software version to the second decimal place
[XT] = Ø = No mute, 1 = Video mute, 2 = Audio mute, 3 = Vid. & Aud. mute, – = Not used
[VO] = Two digit Virtual output number [16 per room max]
[VI] = Two digit Virtual input number
[io] = Four character physical i/o port (BME# + i or o + port#) example 3iØ7
[NAME], [ROOM NAME], [VI NAME] (Virtual Input Name), [VO NAME] (Virtual Output Name) = Maximum of 12 alphanumeric characters (upper and lower case) " " + - : = / and space.

**ASCII to HEX Conversion Table**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [Esc] | 1B | CR | ØD | LF | ØA | · | 2Ø |
| ! | 21 | " | 22 | # | 23 | $ | 24 |
| % | 25 | & | 26 | ' | 27 | ( | 28 |
| ) | 29 | * | 2A | + | 2B | , | 2C |
| - | 2D | . | 2E | / | 2F | Ø | 3Ø |
| 1 | 31 | 2 | 32 | 3 | 33 | 4 | 34 |
| 5 | 35 | 6 | 36 | 7 | 37 | 8 | 38 |
| 9 | 39 | : | 3A | ; | 3B | < | 3C |
| = | 3D | > | 3E | ? | 3F | @ | 4Ø |
| A | 41 | B | 42 | C | 43 | D | 44 |
| E | 45 | F | 46 | G | 47 | H | 48 |
| I | 49 | J | 4A | K | 4B | L | 4C |
| M | 4D | N | 4E | O | 4F | P | 5Ø |
| Q | 51 | R | 52 | S | 53 | T | 54 |
| U | 55 | V | 56 | W | 57 | X | 58 |
| Y | 59 | Z | 5A | [ | 5B | \ | 5C |
| ] | 5D | ^ | 5E | _ | 5F | ` | 6Ø |
| a | 61 | b | 62 | c | 63 | d | 64 |
| e | 65 | f | 66 | g | 67 | h | 68 |
| i | 69 | j | 6A | k | 6B | l | 6C |
| m | 6D | n | 6E | o | 6F | p | 7Ø |
| q | 71 | r | 72 | s | 73 | t | 74 |
| u | 75 | v | 76 | w | 77 | x | 78 |
| y | 79 | z | 7A | { | 7B | \| | 7C |
| } | 7D | ~ | 7E | DEL | 7F | | |

**SIMPLE INSTRUCTION SET COMMANDS (PAGE 1 OF 3)**

| OUTPUT SWITCHING COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| All | [XB]*[XC]! | Out[XC]•In[XB]•All↵ |
| **Example →** | 3*21! | Out21•InØ3↵ |
| Example explanation: Connect Virtual Output 21 to Virtual Input 3 in all Planes (i.e. Audio Follows Video). | | |
| RGB | [XB]*[XC]& | Out[XC]•In[XB]•Vid↵ |
| Video | [XB]*[XC]% | Out[XC]•In[XB]•Vid↵ |
| Audio | [XB]*[XC]$ | Out[XC]•In[XB]•Aud↵ |
| Specific BME | [XB]*[XC]*[XD]! | Out[XC]•In[XB]•Bme[XD]↵ |
| **Example →** | 11*2*2! | OutØ2•In11•BMEØ2↵ |
| Example explanation: Connect physical Output 2 in BME 2 to physical Input 11 in BME 2. | | |

| PRESET COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Save Current | [XJ], | Spr[XJ]↵ |
| Recall | [XJ]. | Rpr[XJ]↵ |
| Save for a room | [XH]*[XK], | Rmm[XH]•Spr[XK]↵ |
| **Example →** | 3*9 | RmmØ3•SprØ9↵ |
| Example explanation: Save Current Ties as Preset #9 for Room #3. | | |
| Recall for a room | [XH]*[XK]. | Rmm[XH]•Rpr[XK]↵ |

| RGB MUTE COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| RGB Mute | [XC]B | Vmt[XI]↵ |
| RGB Un-mute | [XC]b | Vmt[XI]↵ |
| Note: Where [XC] is not included, global RGB mute is activated. | | |

**Simple Instruction Set Commands (Page 2 of 3)**

| Setting Audio Gain Commands | ASCII (Host-Switcher) | RESPONSE (Switcher-Host) |
|---|---|---|
| Positive | [XA]*[XE]G | In[XA]•Aud[XG] ↵ |
| **Example →** | 4*3G | InØ4•Aud+Ø3 ↵ |
| Example explanation: Set Audio Gain on Virtual Input 4 to 3 dB. | | |
| Attenuation | [XA]*[XF]g | In[XA]•Aud[XG] ↵ |
| Increment Audio Level (up) | [XA]{G | In[XA]•Aud[XG] ↵ |
| Decrement Audio Level (down) | [XA]}G | In[XA]•Aud[XG] ↵ |
| **Example →** | 4}G | InØ4•Aud+Ø2 ↵ |
| Example explanation: (Decrement Audio Level on Virtual Input 4 - down 1 dB). | | |

| Audio Mute Commands | ASCII (Host-Switcher) | RESPONSE (Switcher-Host) |
|---|---|---|
| Audio Mute | [XC]Z | Amt[XI] ↵ |
| Audio Un-mute | [XC]z | Amt[XI] ↵ |

Note: Where [XC] is not included, global Audio mute is activated.

| List Commands | ASCII (Host-Switcher) | RESPONSE (Switcher-Host) | | |
|---|---|---|---|---|
| List Room Configuration | LR | ROOM# | NAME | VIRTUAL OUTPUTS ↵ |
| | | Ø1 | [Room Name]$_1$ | ,[VO]$_1$,[VO]$_2$,[VO]$_3$,→[VO]$_n$ ↵ |
| | | Ø2 | [Room Name]$_2$ | ,[VO]$_1$,[VO]$_2$,[VO]$_3$,→[VO]$_n$ ↵ |
| | | Ø3 | [Room Name]$_3$ | ,[VO]$_1$,[VO]$_2$,[VO]$_3$,→[VO]$_n$ ↵ |
| | | ↓ | ↓ | ↓ ↓ ↓ ↓ ↓ |
| | | 1Ø | [Room Name]$_{10}$ | ,[VO]$_1$,[VO]$_2$,[VO]$_3$,→[VO]$_n$ ↵ ↵ |
| **Example →** | LR | ROOM# | Name | VIRTUAL OUTPUTS ↵ |
| | | Ø1 | Security | ,Ø4,11,12,13 ↵ |
| | | Ø2 | Demo Rm | , 27 ↵ |
| | | Ø3 | | , 15,16,17,18 ↵ |
| | | ↓ | ↓ | ↓ |
| | | Ø9 | [unassigned] ↵ | |
| | | 1Ø | Conf. Rm | , 31,32 ↵ ↵ |
| List Virtual inputs | LI | VIRT-IN# | NAME | LVL1 LVL2 →LVL6 ↵ |
| | | Ø1 | [VI Name]$_1$ | ,[VI]$_1$ ,[VI]$_2$ ,→[VI]$_6$ ↵ |
| | | Ø2 | [VI Name]$_2$ | ,[VI]$_1$ ,[VI]$_2$ ,→[VI]$_6$ ↵ |
| | | ↓ | ↓ | ↓ ↓ ↓ |
| | | N | [VI Name]$_n$ | ,[VI]$_1$ ,[VI]$_2$ ,→[VI]$_6$ ↵ ↵ |
| List Virtual outputs | LO | VIRT-OUT# | NAME | LVL1 LVL2 → LVL6 VMUT AMUT ↵ |
| | | Ø1 | [VO Name]$_1$ | ,[VO]$_1$ ,[VO]$_2$ ,→ [VO]$_6$ ,[Xs] ,[Xs] ↵ |
| | | Ø2 | [VO Name]$_2$ | ,[VO]$_1$ ,[VO]$_2$ ,→ [VO]$_6$ ,[Xs] ,[Xs] ↵ |
| | | ↓ | ↓ | ↓ ↓ ↓ ↓ ↓ ↓ ↓ |
| | | N | [VO Name]$_n$ | ,[VO]$_1$ ,[VO]$_2$ ,→ [VO]$_6$ ,[Xs] ,[Xs] ↵ ↵ |
| **Example →** | LO | VIRT-OUT# | NAME | LVL1 LVL2 → LVL6 VMUT AMUT ↵ |
| | | Ø1 | Barco7 | ,1o16 ,1o17 ,1o18 ,2oØ5 ,y ,n ↵ |
| | | Ø2 | Preview | ,1oØ1 ,1oØ2 ,1oØ3 ,2oØ1 ,y ,y ↵ |
| | | ↓ | ↓ | ↓ ↓ ↓ ↓ ↓ ↓ ↓ |
| | | 2Ø | | ,1oØ4 ,1oØ5 ,1oØ6 ,2oØ2 ,y ,n ↵ |
| | | 21 | VCR | ,1oØ7 ,1o62 ,1o63 ,2o21 ,n ,y ↵ ↵ |

**SIMPLE INSTRUCTION SET COMMANDS (PAGE 3 OF 3)**

| LIST COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| List Remote Keypad | LK | ADDR# MODE ID# NAME USER INPUT↵ |

**Example response for LK command →**

| ADDR# | MODE | ID# | NAME | USER INPUT↵ |
|---|---|---|---|---|
| 1 | GLBL | ,ØØ | , | ,Ø1↵ |
| 2 | OUTP | ,14 | ,ConfRm1 | ,Ø5↵ |
| 5 | OUTP | ,15 | ,Security2 | ,Ø5↵ |
| ↓ | ↓ | ↓ | ↓ | ↓ |
| 64 | ROOM | ,1Ø | ,ConfRm2 | ,Ø1↵↵ |

| | | |
|---|---|---|
| List Presets | LP | ROOM# PRESET# NAME FOLLOW MODE↵ |

**Example response for LP command →**

| ROOM# | PRESET# | NAME | FOLLOW MODE↵ |
|---|---|---|---|
| GL | Ø1 | ,DailyConfig | ,ALL↵ |
| ↓ | ↓ | ↓ | ↓ |
| GL | 32 | ,LunchConfig | ,ALL↵ |
| Ø1 | Ø1 | ,WkEndConfig | ,NO↵ |
| Ø1 | Ø2 | ,NightConfig | ,ALL↵ |
| ↓ | ↓ | ↓ | ↓ |
| 1Ø | 1Ø | ,TestConfig | ,NO↵↵ |

| INFORMATION COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Query Software Version | Q/q | Ver[Xs]↵ |
| Specific BME | [XD]Q/q | Ver[Xs]↵ |

**Example →** 4Q Ver 1.ØØ↵

Example explanation: Query Firmware version of BME #4.
4Q or 4q is acceptable as ASCII command format.

| | | | |
|---|---|---|---|
| Request Part Number | N/n | N6Ø-25x-io fr↵ | (Response = BME #Ø Part Number) |
| Specific BME | [XD]N/n | N6Ø-25x-io fr↵ | |

Note: x = Ø = Matrix 64ØØ Wideband, x = 1 = Matrix 32ØØ Wideband, x = 2 = Matrix 64ØØ Lo Res,
x = 3 = Matrix 32ØØ Lo Res, x = 4 = Matrix 64ØØ Sync, x = 5 = Matrix 32ØØ Sync, x = 6 = Audio.
io = Two character Input/Output Matrix configuration code (see Page B-1)
f = FPC-1ØØØ installed?, Ø = No, 1 = Yes. r = Redundant Power Supplies installed?, Ø = No, 1 = Yes.

| | | |
|---|---|---|
| Request Information | I/i | I[IN SIZE]X[OUT SIZE]•T[TECHNOLOGY]•U[# OF UNITS]•M[IN MAP SIZE] X[OUT MAP SIZE]•Vmt[Xi]•Amt[Xi]•Sys[XN]•Dgn[XQ]↵ |
| **Example →** | I | I64X64•T1•U2•M21X21•VmtØ•Amt1•Sys1•DgnØØ↵ |

Example explanation: I64X64 indicates that this BME has 64 physical inputs and 64 physical outputs. T1= Wideband Switcher, U2 indicates system has 2 BMEs and is set to M21X21 (21 Virtual Inputs and 21 Virtual Outputs). VmtØ = Video is not Muted, Amt1 = Audio is Muted. Sys1 indicates that this BME has no redundant power supply and the main power supply is on. DgnØØ indicates no error (BME's self-test diagnostics passed. Dgn2Ø if reported = System physical size has changed since last virtualized.

| | | |
|---|---|---|
| Specific BME | [XD]I/i | Same as Request Information Response above. |

Notes:
1. Command "ØI " is equivalent to "I" or "i" command.
2. [TECHNOLOGY] 1 = Wideband, 2 = Lo-Res, 3 = Sync, 4 = Audio (for this BME), Ø = BME not present.
3. [IN SIZE] + [OUT SIZE] is physical size of this BME.
4. [IN SIZE], [OUT SIZE], [# OF UNITS], [IN MAP SIZE], [OUT MAP SIZE] are each two digit fields.

**ADVANCED INSTRUCTION SET AND SIMPLE INSTRUCTION SET COMMANDS (PAGE 1 OF 3)**

| VIEW COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Audio Gain | V/v [XA] G | In [XA] ·Aud [XG] ↵ |
| **Example →** | V15G | In15•Aud-Ø6 ↵ |

Example explanation: Virtual Input 15 Audio Level is set to -6 dB.

| | | |
|---|---|---|
| Global PRESET information | [XJ] VI | [PRESET NAME],Grp [XL] ↵ |
| **Example →** | ØVI | Jims_Lecture,GrpA ↵ |
| Global PRESET Ties | [XJ] * [XC] *ØØVA | [VI] [XC] • [VI] [XC]+1 • [VI] [XC]+2 → • [VI] [XC]+15 •All ↵ |

*Views are 16 virtual outputs at a time; each position shows what virtual input is connected to that virtual output. Preset Ø views the current configuration.*

**Example 1 →** Ø*Ø1*ØØVA

Ø4•64•ØØ•ØØ•ØØ•ØØ•Ø3•Ø1•ØØ•ØØ•ØØ•ØØ•64•ØØ•Ø1•ØØ•ØØ•All↵

(virtual input #4 tied to virtual output #1; no virtual input tied to virtual output #16; virtual input #64 tied to virtual output #2)

Example 1 explanation: Read Preset Ø (current) Ties of Virtual Inputs to Virtual Outputs Ø1 through 16 in Follow mode.

**Example 2 →** Ø*17*ØØVA

Ø4•64•ØØ•ØØ•ØØ•ØØ•Ø3•Ø1•ØØ•ØØ•ØØ•ØØ•64•ØØ•Ø1•ØØ•ØØ•All↵

(virtual input #4 tied to virtual output #17; no virtual input tied to virtual output #32; virtual input #64 tied to virtual output #18)

Example 2 explanation: Read Preset Ø (current) Ties of Virtual Inputs to Virtual Outputs 17 through 32 in Follow mode.

**Example 3 →** 3*49*ØØVA

Ø4•---•ØØ•ØØ•ØØ•---•Ø3•Ø1•na•na•na•na•na•na•na•na•All↵

(virtual input #4 tied to virtual output #49; in a 64 virtual input x 56 virtual output configuration, the last 8 virtual outputs are nonexistent (see note 2 below); virtual output #50 does not have audio follow (see note 3 below))

Example 3 explanation: Read Preset 3 Ties of Virtual Inputs to Virtual Outputs 49 through 64 in Follow mode.

| | | |
|---|---|---|
| Global PRESET w/Total Breakaway | [XJ] * [XC] * [XP] VC | [VI] [XC] • [VI] [XC]+1 • [VI] [XC]+2 → • [VI] [XC]+15 •Plane [XP] ↵ |
| Command description → | preset*start-output*plane | |
| Global PRESET by Specific BME | [XJ] * [XC] * [XD] VD | [XB] [XC] • [XB] [XC]+1 • [XB] [XC]+2 → • [XB] [XC]+15 •Bme [XD] ↵ |
| Command description → | preset*start-output*BME# | |
| Room PRESET information | [XH] * [XK] VI | [PRESET NAME],Grp [XL] ↵ |
| Room PRESET Ties | [XH] * [XK] *Ø1*ØØVA | [VI]1 → • [VI]Rvo.... •All ↵ |
| Room PRESET w/Total Breakaway | [XH] * [XK] *Ø1* [XP] VC | [VI]1 → • [VI]Rvo.... •Plane [XP] ↵ |
| Command description → | room*preset*start-output*plan | |

| Command | Response | Description |
|---|---|---|
| 1VI | Jims_Lecture,GrpB ↵ | Read Preset 1 breakaway information (follow versus breakaway mode) |

In the 4 examples below, all Ties are read from a 32 x 32 virtual RGBA (red, green, Blue, Audio) system with Audio/Video breakaway (Grp B). In Examples 1 and 2 below (Video breakaway), only virtual plane 1 (Red) needs to be read, since virtual planes 2 and 3 (Green and Blue) are the same as virtual plane 1. Examples 3 and 4 below refer to virtual Audio breakaway with virtual plane 4 representing Audio.

**Example 1 →** 1*Ø1*Ø1VC

Ø4•64•ØØ•ØØ•ØØ•ØØ•Ø3•Ø1•ØØ•ØØ•ØØ•ØØ•64•ØØ•Ø1•ØØ•ØØ•Plane 1↵

Explanation: Read Preset 1 Red (plane 1) Ties of Virtual Video Inputs to Virtual Video Outputs Ø1 through 16.

**Example 2 →** 1*17*Ø1VC

Ø4•64•ØØ•ØØ•ØØ•ØØ•Ø3•Ø1•ØØ•ØØ•ØØ•ØØ•64•ØØ•Ø1•ØØ•ØØ•Plane 1↵

Explanation: Read Preset 1 Red (plane 1) Ties of Virtual Video Inputs to Virtual Video Outputs 17 through 32.

**Example 3 →** 1*Ø1*Ø4VC

Ø4•64•ØØ•ØØ•ØØ•ØØ•Ø3•Ø1•ØØ•ØØ•ØØ•ØØ•64•ØØ•Ø1•ØØ•ØØ•Plane 4↵

Explanation: Read Preset 1 Audio (plane 4) Ties of Virtual Audio Inputs to Virtual Audio Outputs Ø1 through 16.

**Example 4 →** 1*17*Ø4VC

Ø4•64•ØØ•ØØ•ØØ•ØØ•Ø3•Ø1•ØØ•ØØ•ØØ•ØØ•64•ØØ•Ø1•ØØ•ØØ•Plane 4↵

(virtual input #4 tied to virtual output #17; no virtual input tied to virtual output #32; virtual input #64 tied to virtual output #18; virtual audio plane)

Explanation: Read Preset 1 Audio (plane 4) Ties of Virtual Audio Inputs to Virtual Audio Outputs 17 through 32.

**ADVANCED INSTRUCTION SET AND SIMPLE INSTRUCTION SET COMMANDS (PAGE 2 OF 3)**

| VIEW COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Virtual Output MUTES | VM | [XT]$_1$•[XT]$_2$•••••[XT]$_{64}$Mut↵ |

Notes:
1. Start output is always Ø1 for Room PRESET, because room has max. of 16 outputs assigned.
2. All "VI" values in responses are 2 numeric characters (i.e. 12 or Ø3) or "na" indicating nonexistent virtual outputs.
3. In "VA" View, any outputs that do not follow show as "- -" in response.
4. Rvo = Virtual Output assigned to specified "room" (up to 16 total).

| RGB DELAY COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Read RGB Delay (for 1 ch.) | [Esc]D[XC]← | Out[XC]•Dly[XM]↵ |
| Set RGB Delay (for 1 ch.) | [Esc]d[XM]*[XC]← | Out[XC]•Dly[XM]↵ |

Note: Where [XM] = delay in 1/2 second increments (i.e. Ø = Ø sec, 1Ø = 5.Ø sec)

| DIRECT WRITE OF GLOBAL PRESETS COMMAND | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Start Write Mode | [Esc]P[XJ]← | Write Preset [XJ] Ready↵ |
| End Write Mode | [Esc]p← | End Write Preset [XJ]↵ |
| **Example →** | [Esc]P32← | Write Preset 32 Ready↵ |
| | 1*1! | |
| | 1*2& | |
| | 1*3% | |
| | : | |
| | : | |
| | 1*64$ | |
| | [Esc]p← | End Write Preset 32↵ |

Notes:
1. Any non-output switching or invalid command between the Start and End commands will be ignored.
2. If there is no activity for 5 seconds while in write mode, then error E17 occurs.
3. No front panel switching (Actual Switching) is allowed during the Start and End commands.
4. If an End ([Esc]p) command is issued with no Start command, then error E1Ø occurs.

| QUICK RECALL OF GLOBAL PRESET COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Quick Recall Preset | [Esc].← | RPR [XJ]↵ |

Notes:
1. If the Quick Recall Preset ([Esc].) command is issued without an active write, then error E1Ø occurs.
2. Complete backplane switch within 6ØmS (apprx.) after receipt of the command.
3. Recall must take place 1ØØmS after End Write Mode command ([Esc]p).
4. Quick recall command only recalls last entered direct write preset.

| SET NAMES COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Read Global preset name | [Esc]NG[XJ]← | [NAME]↵ |
| Write Global preset name | [Esc]nG[XJ],[NAME]← | NamP↵ |
| Read Room preset name | [Esc]NP[XH]*[XK]← | [NAME]↵ |
| Write Room preset name | [Esc]nP[XH]*[XK],[NAME]← | NamP↵ |
| Read Room Name | [Esc]NR[XH]← | [NAME]↵ |
| Write Room Name | [Esc]nR[XH],[NAME]← | NamR↵ |
| Read Virtual Input Name | [Esc]NI[XB]← | [NAME]↵ |
| Write Virtual Input Name | [Esc]nI[XB],[NAME]← | NamI↵ |
| Read Virtual Output Name | [Esc]NO[XC]← | [NAME]↵ |
| Write Virtual Output Name | [Esc]nO[XC],[NAME]← | NamO↵ |

| ZAP CONFIGURATION COMMANDS | ASCII (HOST-SWITCHER) | RESPONSE (SWITCHER-HOST) |
|---|---|---|
| Zap All Global presets & names | [Esc]zG← | ZapG↵ |

| ADVANCED INSTRUCTION SET AND SIMPLE INSTRUCTION SET COMMANDS (PAGE 3 OF 3) | | |
|---|---|---|
| **ZAP CONFIGURATION COMMANDS** | **ASCII (HOST-SWITCHER)** | **RESPONSE (SWITCHER-HOST)** |
| Zap individual Global | Esc zT XJ ← | ZapT ↵ |
| Zap All Room presets & names | Esc zP ← | ZapP ↵ |
| Zap individual Room Preset | Esc zT XH * XK ← | ZapT ↵ |
| Zap All RGB Delay to Ø sec. | Esc zD ← | ZapD ↵ |
| Zap all Audio Gains to Ø dB. | Esc zA ← | ZapA ↵ |
| UnMute RGB/Audio (All Mutes) | Esc zZ ← | ZapZ ↵ |
| Master Reset | Esc zXXX ← | ZapXXX ↵ |

## ERROR CODES

IIf the switcher receives a command that is invalid or contains invalid parameters, it will return an Error Code response. The error code response has the format "Exx". Following is a list of possible error code responses.

| | Description of Error code |
|---|---|
| EØ1 ↵ | Invalid input channel number (too large) |
| EØ5 ↵ | Device is off |
| E1Ø ↵ | Invalid command |
| E11 ↵ | Invalid preset number (too large) |
| E12 ↵ | Invalid output number (too large) |
| E13 ↵ | Value too large (Gain) |
| E14 ↵ | Command not available for matrix configuration |
| E17 ↵ | Timeout |
| E2Ø ↵ | Invalid BME number |
| E21 ↵ | Invalid Room number |
| E22 ↵ | Busy |
| E23 ↵ | Checksum error |

## SWITCHER GENERATED UNSOLICITED RESPONSES

When a local event takes place, such as a Front Panel operation, the switcher responds by sending an unsolicited response (RECONFIGxx) to the Host. Use the 2 digit code xx to locate a description of the event below.

RECONFIGØØ = Audio level change

RECONFIGØ2 = Room#1 or room#1's preset name change
RECONFIGØ3 = Room#2 or room#2's preset name change
RECONFIGØ4 = Room#3 or room#3's preset name change
RECONFIGØ5 = Room#4 or room#4's preset name change
RECONFIGØ6 = Room#5 or room#5's preset name change
RECONFIGØ7 = Room#6 or room#6's preset name change
RECONFIGØ8 = Room#7 or room#7's preset name change
RECONFIGØ9 = Room#8 or room#8's preset name change
RECONFIG1Ø = Room#9 or room#9's preset name change
RECONFIG11 = Room#1Ø or room#1Ø's preset name change

RECONFIG12 = Name change for global preset #1-16
RECONFIG13 = Name change for global preset #17-32

RECONFIG14 = Current connection change

RECONFIG17 = Name change for virtual input #1-16
RECONFIG18 = Name change for virtual input #17-32
RECONFIG19 = Name change for virtual input #33-48
RECONFIG2Ø = Name change for virtual input #49-64

RECONFIG21 = Name change for virtual output #1-16
RECONFIG22 = Name change for virtual output #17-32
RECONFIG23 = Name change for virtual output #33-48
RECONFIG24 = Name change for virtual output #49-64

RECONFIG25 = Individual mute change

RECONFIG26 = RGB->SYNC delay change

RECONFIG34 = A global preset has been saved
RECONFIG35 = A room preset has been saved
RECONFIG36 = All RGB Sync Delays initialized (Zapped to Ø sec)
RECONFIG37 = All Audio Levels initialized (Zapped to Ø dB)
RECONFIG38 = All Mutes initialized (Zapped to UnMuted)

RECONFIG4Ø = Global mute change
RECONFIG41 = Power supply status changed

RECONFIG99 = Entire System initialized (Master Reset)

# Chapter Five
## Upgrades and Troubleshooting

*Upgrade and Troubleshooting Procedures*

*Installing Software Update (IC Chip)*

*Swapping RS-232/RS-422 Ports*

*Changing the AC Fuse*

*Upgrades*

## Upgrade and Troubleshooting Procedures

The following procedures may be done in the field.

- Add Front Panel Controller (FPC 1000) - see below.
- Installing a Software Upgrade - see Page 5-3.
- Swapping RS-232 / RS-422 Ports - see Page 5-4.
- Troubleshooting a system problem - see Page 5-5.
- Adding Video cards to a Matrix 3200/6400 Video Switcher- see Page 5-7.
- Adding BMEs to a Matrix 6400/3200 System - see Page 5-9.

### Adding a Front Panel Controller to an existing system

Adding a Front Panel Controller to an existing system involves replacing the blank Access Panel on any BME (except Sync) with the FPC 1000 panel. A system can only have one Front Panel Controller and it must be installed on BME #0. The details for installing the FPC 1000 are included in the User's Manual provided with the unit.

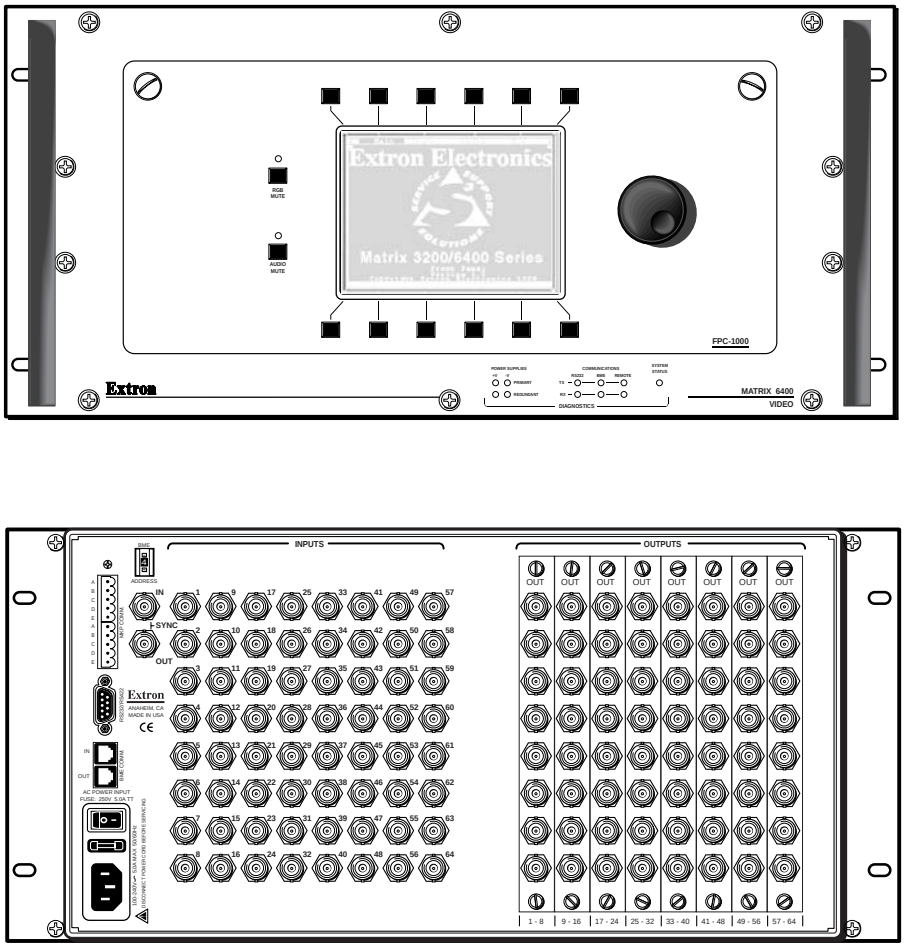



Figure 5-1.A Matrix 6400 Video BME Front and Rear Panels

## Matrix 3200/6400 Video BME Internal Access

*Before opening the BME, turn power OFF and unplug the AC power cord. High voltages are present inside the BME and the FPC 1000 Front Panel Controller.*

Upgrades or repairs may require access to internal areas of the Matrix 3200/6400 Video BME. This involves removing the access panel (blank or FPC 1000) using a coin or a flat blade screwdriver to rotate the two captive screws (Figure 5-2.A) as shown in Figure 5-2.B. Pull the top of the access panel out slightly then lift up and remove it from the front panel. The FPC 1000 will have a cable connecting it to the Main Controller, unplug the connector.

When done, reverse the procedure to reinstall the access panel

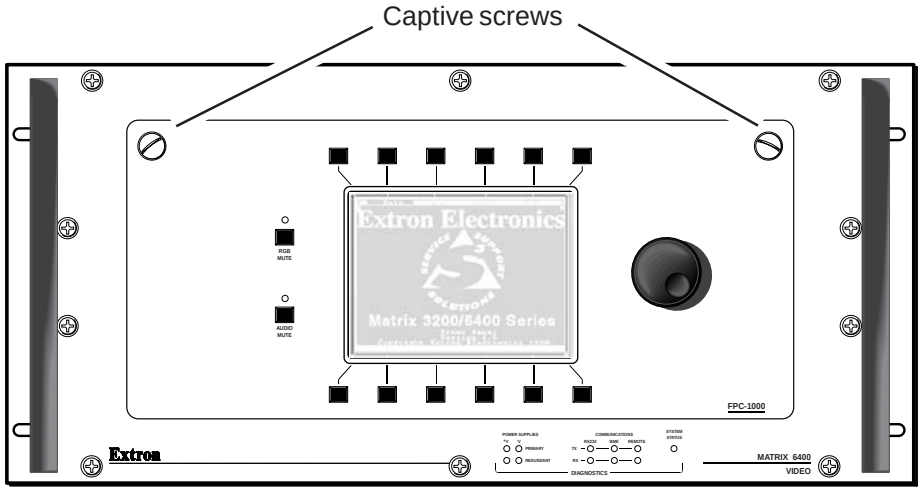



Figure 5-2.A Use a coin or screwdriver to rotate two captive screws.

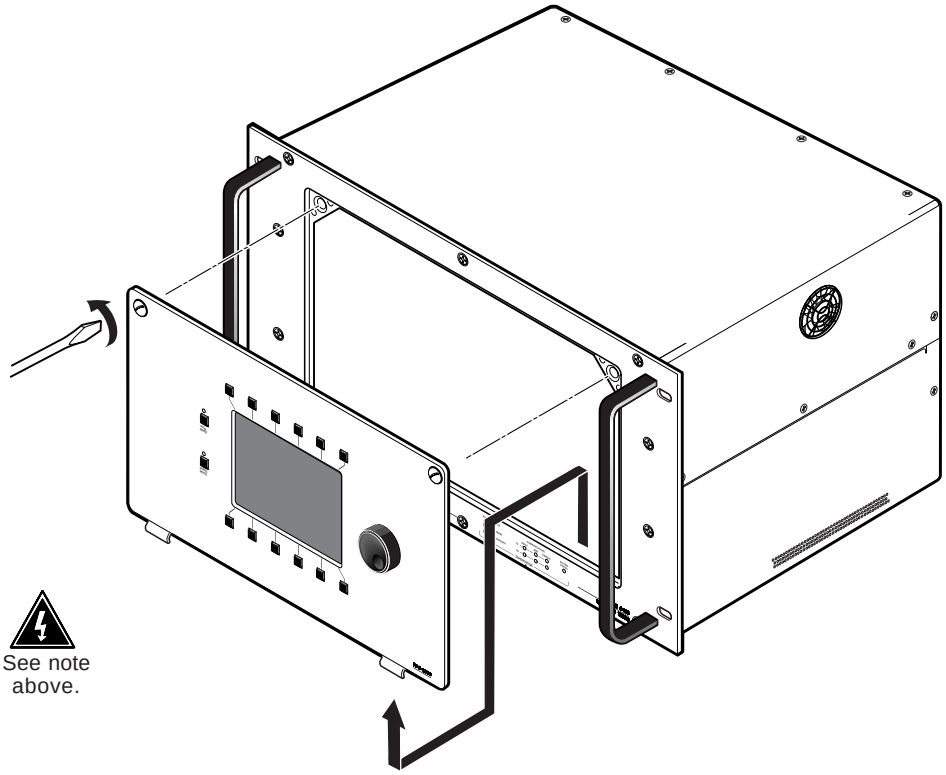



Figure 5-2.B Removing the access panel (blank or FPC 1000)

## Installing A Software Update

To install a software update, IC U9 or U6 (or both) on the Main Control printed circuit card is replaced. If the system consists of multiple BMEs, the software IC(s) in each BME's Main Control PCB may need to be updated. Use the following procedure to replace the Matrix 3200/6400 Video Main Control PCB IC(s).

1. Power the system OFF and unplug the AC power cord.
2. Remove the Access Panel. See Page 5-2.
3. Use the PLCC IC puller (Figure 5-3.A) to remove the existing Software IC. Squeeze the tool to align the hooks with the slots provided in opposite corners of IC socket U9 or U6. Insert the hooks, squeeze gently and pull the IC straight out of the socket. Set the IC aside.
4. Note the key (angled corner) of the new Software IC. Orient this to match the key of the socket and carefully press it in place.
5. Reinstall the Access Panel.
6. Plug in the AC power cord, power the system ON.
7. Verify that the switcher is working properly.

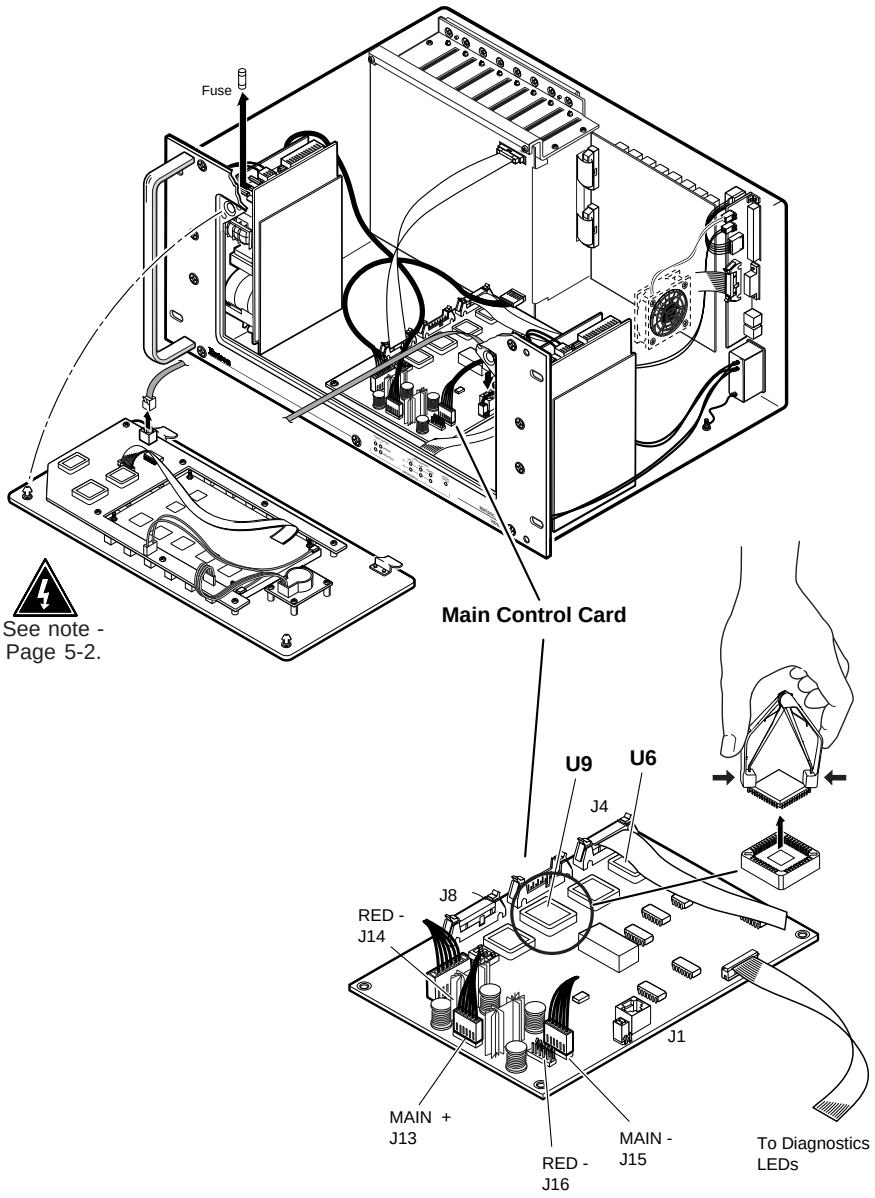



Figure 5-3.A Updating the Software IC on the Main Control Card

## Swapping BME #0 RS-232 / RS-422 Ports

Swapping BME #0 RS-232/RS-422 ports (not required on BME #1 - BME #5) involves moving a ribbon cable from one Main Control card connector to another.

### Ribbon Cable Connectors

The ribbon cables used in the Matrix 3200/6400 Video Switcher use a self-latching style receptacle. Figure 5-4.A shows how it operates.

1. Press each of the two tabs outward, this unlocks the receptacle and ejects the ribbon cable connector part way. Pull evenly on the ribbon cable connector to remove it.
2. When reconnecting the cable, first align the pins in the receptacle with the holes in the connector and press evenly into the receptacle until the receptacle tabs lock the connector in place.

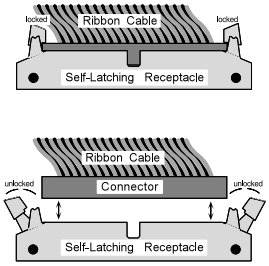



Figure 5-4.A

### Swapping Serial Ports (RS-232/RS-422)

⚠ _____ *Before working inside, unplug the power cord.*

The Matrix 3200/6400 Video Switcher is normally connected for RS-232 use. If your application requires RS-422, follow this procedure (and Figure 5-4.B) to change the configuration. The procedure for removing and installing the ribbon cables is described above in "Ribbon Cable Connectors" above.

1. Power OFF BME #0, unplug the power cord.
2. Remove the Access Panel on BME #0 (Page 5-2), locate the Main Control card (see Figure 5-3.A).
3. Locate two ribbon cable receptacles (Figure 5-4.B) One is empty and the other has a ribbon cable which goes to the rear panel. J4 is the RS-232 receptacle and J5 is the RS-422 receptacle. If the connection is not correct for your application, disconnect the cable and move it to the other receptacle.
4. Reinstall the Access Panel.
5. Plug in the AC power cord, power ON the BME.

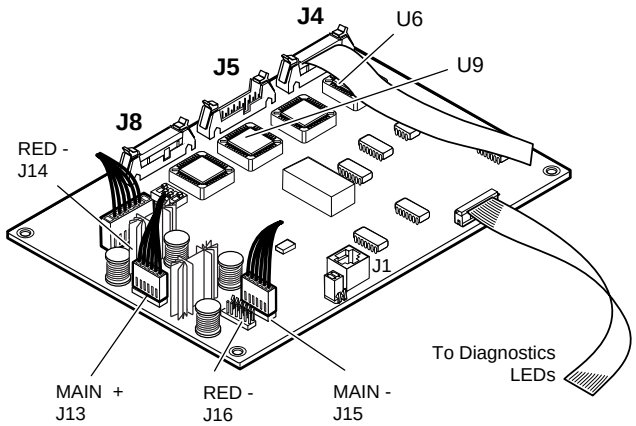



Figure 5-4.B Main Control Card - for card location, see Figure 5-3.A.

## Troubleshooting a Matrix 3200/6400 System Problem

All Matrix 3200/6400 BME front panels include LEDs at the bottom of the panel which are bracketed and labeled DIAGNOSTICS. These LEDs (Figure 5-6.A) indicate the current status of the BME power supplies, the RS232/BME/MKP[1] Communications RX and TX lines, and the System Status. The following descriptions include normal/failure/status conditions for each LED.

### Power Supplies

| | | |
|---|---|---|
| Primary +V | Green LED | ON = Normal<br>OFF = Failure |
| Primary -V | Green LED | ON = Normal<br>OFF = Failure |
| Redundant +V | Green LED | ON = Normal<br>OFF = Failure (or Redundant not present)<br>Blinking = Redundant +V supplying full +V load (indicates Primary +V power supply failure) |
| Redundant -V | Green LED | ON = Normal<br>OFF = Failure (or Redundant not present)<br>Blinking = Redundant -V supplying full +V load (indicates Primary -V power supply failure) |

☞ _____ *If a BME fails to power ON, check the BME external AC fuse (see Page 5-6). If the Diagnostic LEDs indicate that a power supply has failed, check the power supply fuse (see Page 5-6).*

*BME #0 must be powered ON at the same time or after other BMEs. Any BME powered on after BME #0 will not be seen by the internal system software.*

### Communications

RS232 TX - Red LED ON/Blinking = BME is transmitting data to Host
RS232 RX - Green LED ON/Blinking = BME is receiving data from Host
BME TX - Red LED ON/Blinking = BME is transmitting data
BME RX - Green LED ON/Blinking = BME is receiving data
MKP TX - Red LED ON/Blinking = BME is transmitting to Remote keypad
MKP RX - Green LED ON/Blinking = BME is receiving from Remote keypad

☞ _____ *1. MKP TX/RX LEDs are not present on SYNC BMEs.*
*2. MKP LED conditions above apply only to BME #0.*
*3. RS-232 LED conditions above apply only to BME #0.*
*4. A communications failure between BME #0 and other BMEs could be caused by one BME loading down the BME TX or RX line. To determine if that is the case, run the RJ-11 BME COMM interconnecting cable to bypass each BME one at a time.*

| | | |
|---|---|---|
| System Status | Amber LED | ON = Normal<br>OFF = System failure - Call Extron Tech Support<br>Blinking = Busy |

## Checking/Replacing the BME External AC Input Fuse

The AC power input cord plugs into the Power-Switch/Fuse assembly which is located on the rear panel in the lower left corner of the BME. To check/replace the external fuse, remove the power-cord and insert the tip of a small screwdriver blade into the fuse-holder slot (the fuse-holder is located just below the power switch). Pry the fuse-holder out, it contains the AC input fuse plus a spare. If may be obvious that the fuse is blown, if not, check it with an ohmmeter or any other continuity device if available. If the fuse is blown, replace it with the provided spare. Plug the AC power cord in and Power the BME ON. Verify that the unit powered ON correctly (check Front Panel LEDs). If the LEDs are in the proper state, the problem has been corrected. If not, contact Extron Technical Support.

## Checking/Replacing the BME Internal Power Supply AC Input Fuses

Each internal power supply has an AC input fuse. If a power supply fuse blows, the Front Panel LED for that power supply will go OFF (it is normally solid ON). If the BME has redundant power supplies, the redundant supply for the failed power supply will assume the full load and its front panel diagnostic LED will blink indicating that the Main (Primary) power supply is inoperative. To check/replace a power supply fuse, unplug the AC power cord from the BME rear panel, remove the Access Panel (see Page 5-2). The power supply fuse location is shown in Figure 5-6.A (circled). Remove the fuse from the problem power supply. If may be obvious that the fuse is blown, if not, check it with an ohmmeter or any other continuity device if available. If the fuse is blown, replace it, plug the AC power cord in, power up the BME and check Diagnostic LEDs. If the problem persists, call Extron Technical Support.

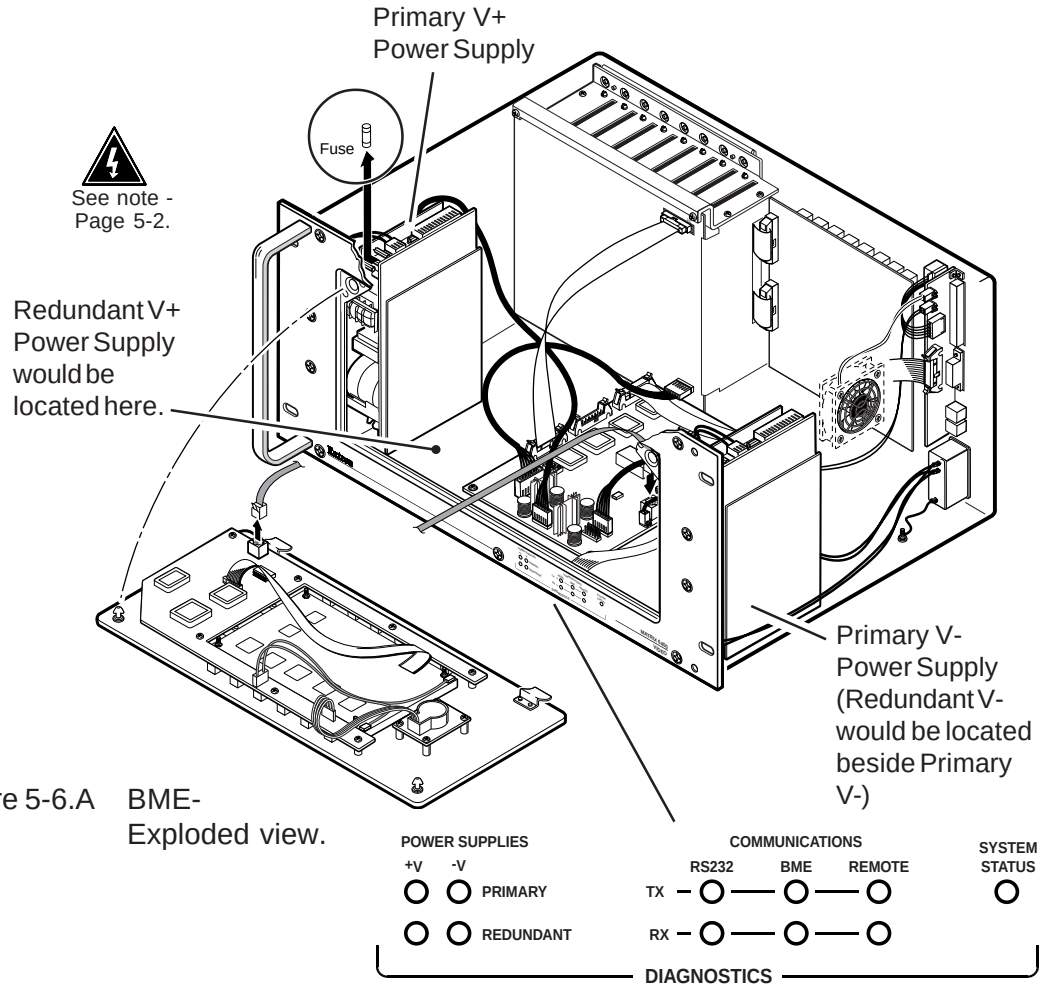



Figure 5-6.A BME- Exploded view.

## Matrix 3200/6400 Video Switcher Upgrade - Changing the Matrix Size

Changing the matrix size of a Matrix 6400 Video Switcher may require adding or removing output Video circuit cards. Page 5-8 describes the procedure for determining the required number of output cards for the desired matrix size and which connectors the cards should be plugged into. The following procedure describes how to change the matrix size.

1. See Page 5-11 “Software Procedure - Before and After a Hardware Upgrade”. Do steps under “Before Hardware Changes” prior to making any hardware changes.

⚠ ——— *To ignore step 1 and proceed with the hardware upgrade will require considerable system reconfiguration time. It is highly recommended that you not skip any step.*

2. Turn OFF the AC power switch and unplug the AC power cord.
3. Plug the Video cards in as required (see page 5-8).
4. Plug the AC power cord in and turn ON the AC power switch.
5. Do the steps under “After Hardware Changes” on Page 5-12.
6. Verify that the new matrix size is correctly identified by the software.

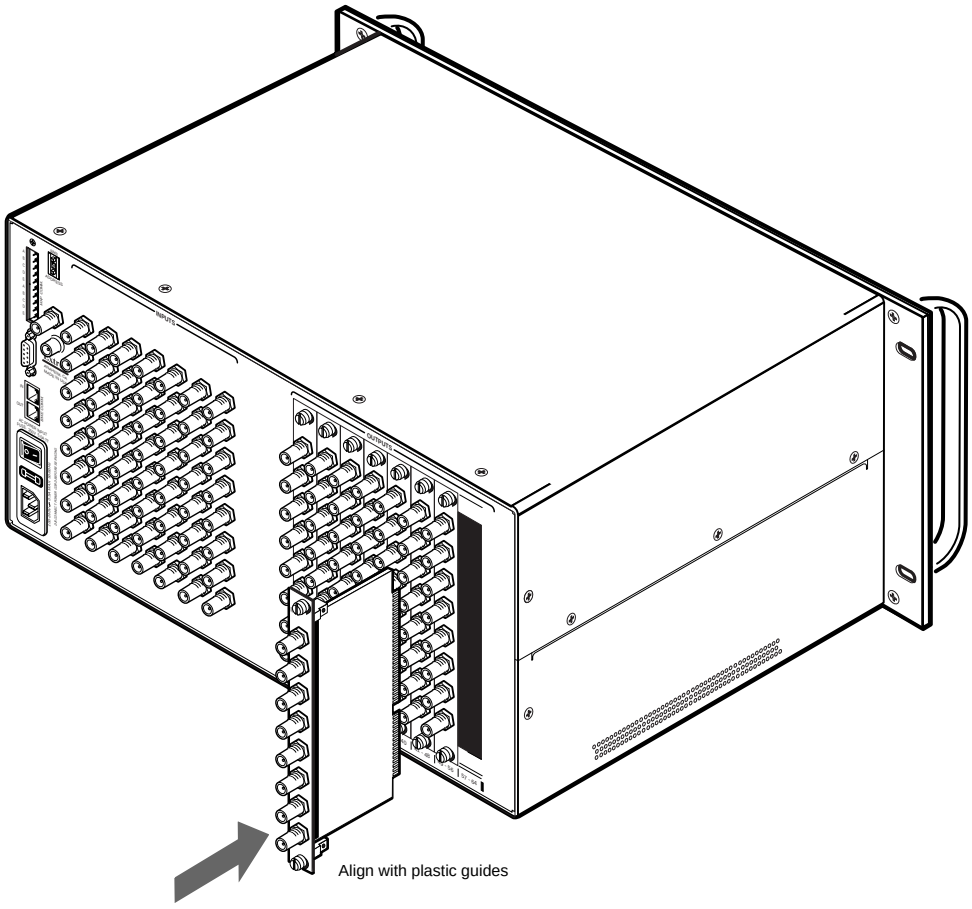
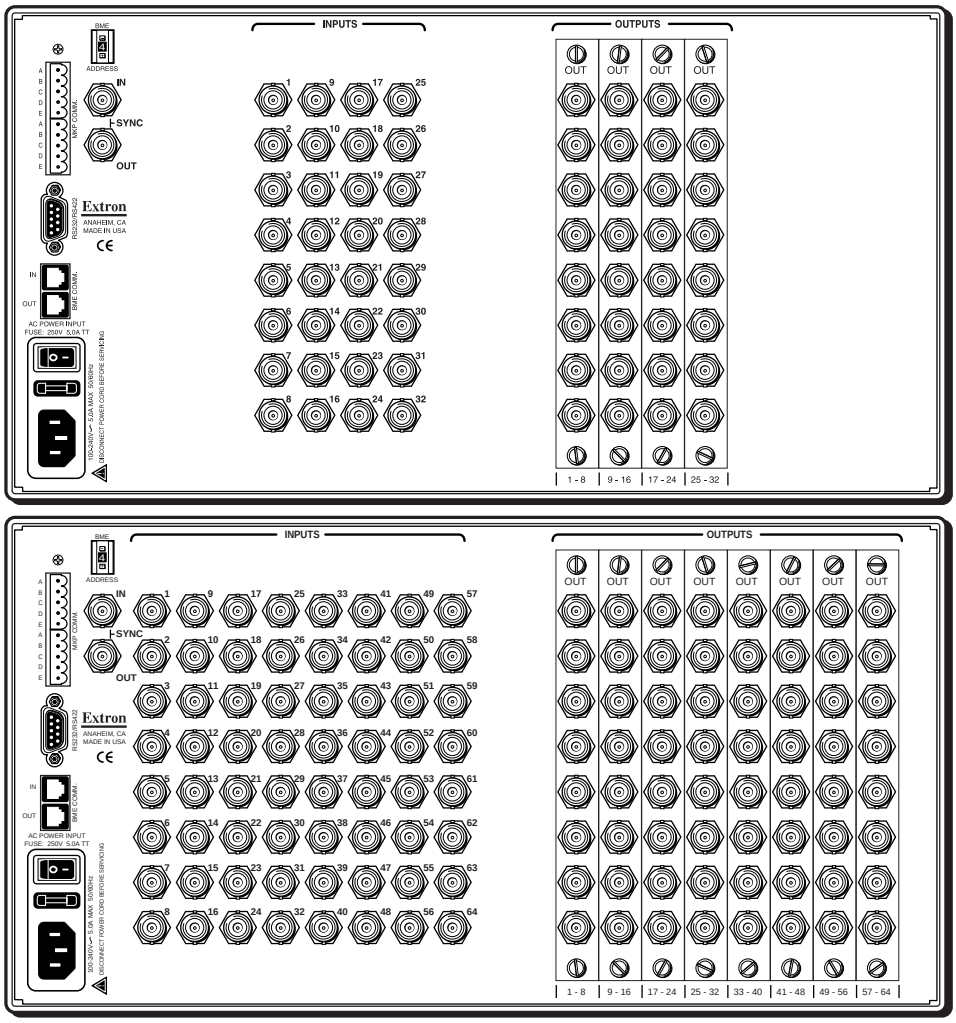



Figure 5-7.A Inserting an output video card into the BME.




## Determining Video Output Card Population

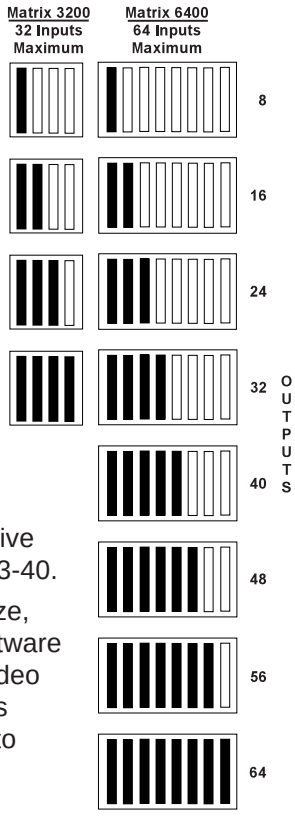
The drawings above show the rear panel layout for the Matrix 3200 and Matrix 6400 Video Switchers. The number of input connectors is fixed at 32 or 64; the number of output connectors depends on the number of Video Output cards and is variable from 8 to 32 or 64 in multiples of 8. Each card supports 8 video outputs and each card slot is labeled to identify the physical connector range supported by the card in that slot (low number = top connector, high number = bottom connector on card).

The chart to the right shows the only supported Video card population for the following configurations.

32 inputs x 8, 16, 24, 32 outputs
64 inputs x 8, 16, 24, 32, 40, 48, 56, 64 outputs

An example matrix configuration of 64x40 would require five Video Output cards in slots 1-8, 9-16, 17-24, 25-32 and 33-40.

If the cards are not installed as shown for each matrix size, the Extron Matrix 6400 System Virtualization/Control Software will be unable to accurately virtualize the system. The Video Output circuit cards (PN# 70-068-01) plug into connectors OUTPUTS 1-8 through 25-32 or 57-64. It is not possible to plug the circuit cards in upside down.



## Adding BME(s) to a Matrix 3200/6400 System

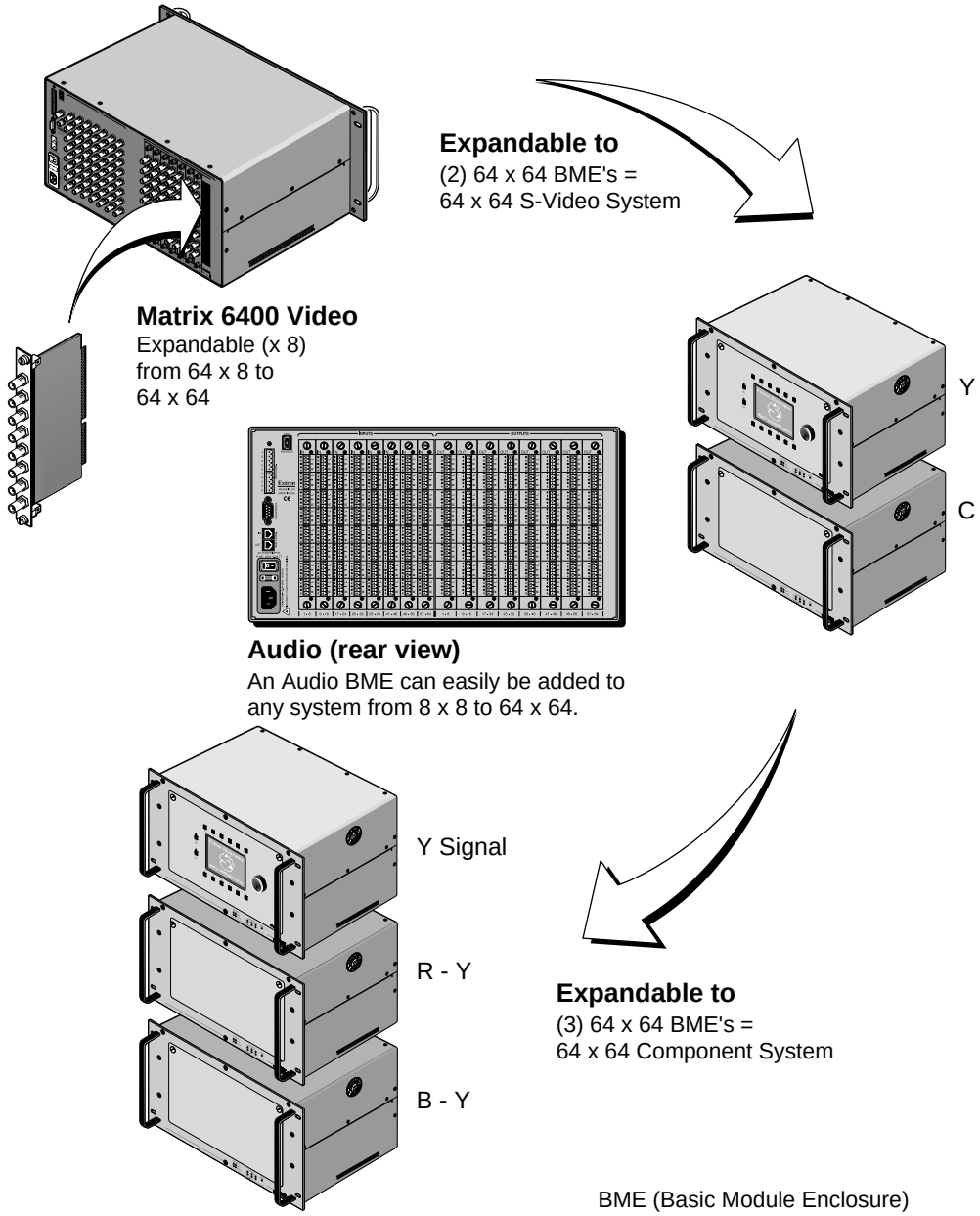



Figure 5-9.A Adding BMEs to a Matrix 3200/6400 system

Adding BME(s) to an existing Matrix 3200/6400 System involves doing most of the same steps as an initial installation. Extron recommends that the following steps be done in the order listed to add a Video BME (maximum Video BMEs per system = 3) and/or an Audio BME (maximum Audio BMEs per system = 1) to an existing system.

1. See Page 5-11 “Software Procedure - Before and After a Hardware Upgrade”. Do steps under “Before Hardware Changes” before making any hardware changes.

⚠ _____ *To ignore step 1 and proceed with the hardware upgrade will require considerable system reconfiguration time. It is highly recommended that you not skip any step.*

2. Remove power before proceeding. Go to “Adding a Video and/or an Audio BME” (below). If this is not a Video or Audio BME add-on, go to Chapter 2.
3. Set the BME address numbers (0 - 5). (Page 2-2)
4. Connect the BME COMM interconnecting cable(s). (Page 2-2)

5. Connect the RS-232/RS-422 cable to the serial port of BME #0. (Page 2-2)
6. Connect the AC Power cable(s) to the BME(s). (Page 2-2)
7. Apply AC power to the BMEs and Verify Normal Power-Up. (Page 2-2)
8. Do the steps under “After Hardware Changes” on Page 5-12.
9. Connect cables to BMEs (video, sync and/or audio cables). (Page 2-4)

The procedure for adding a Video and/or an Audio BME follows.

### Adding a Video and/or an Audio BME

Matrix 3200/6400 Video BME(s) and/or a Matrix 6400 Audio BME may be installed in a rack with an existing Matrix 3200/6400 Video system, or in a different location. BMEs may be separated by up to 12 feet and rack mounting is NOT required. If the Video and/or Audio BME(s) are going to be rack mounted with other BMEs, they may be mounted in any order within a rack or cabinet. There are no restrictions to the order in which BMEs may be mounted relative to each other. Logically, the BME addresses in a system such as the one shown in Figure 5-10.A would be set to 0 - 5 sequentially from top to bottom, however, a different order is acceptable and will not impact system operation in any way.

Equipment location within a room should be given careful consideration. Poor planning, with the number of cables involved, could result in a cluttered appearance. Power requirements and
the amount of heat exhaust from the system should be taken into consideration.

The following restrictions apply to installing BMEs.

- One BME must be assigned as BME#0.
- A BME with an FPC 1000 must be BME#0.
- Address assignments must not skip numbers.
- Address assignments of 0 - 5 are accepted, BMEs w/address 6-9 are ignored.
- A Matrix 3200/6400 Video system is limited to a maximum of 3 Video and one Audio BME(s).

See Page 2-1 for other BME restrictions.
Return to step 3 above.

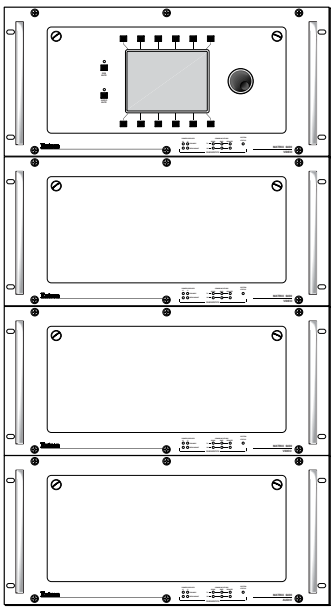


Figure 5-10.A Example of a Matrix 3200/6400 Video rack-mounted system

## Software Procedure – Before and After a Hardware Upgrade

Prior to upgrading a Matrix 3200/6400 Video Switcher System, read the "Upgrade System – Software Procedure" below. The suggested procedure can save you a lot of time reconfiguring a system that is going to have a hardware upgrade installed. The procedure includes steps to be performed before and after the hardware upgrade.

### Upgrade System – Software Procedure

The UPGRADE WIZARD is started by clicking the TOOLS | UPGRADE menu on the main screen. It guides you through restoration of all your system settings (programming of Presets, Virtual Names, Rooms, etc.) when you add more physical IO ports or more BMEs to your existing 3200/6400 system.

The following procedures must be done in the sequence listed to save the original system settings and use them to create a new configuration.

#### Before Hardware Changes

Do the following steps BEFORE starting the hardware upgrade:

1. From Windows open the "Extron Electronics" program group or folder.

2. Double click the "Matrix 6400 Control Pgm" icon to start the program. You will be asked to select the COMM port, or choose "Emulate" mode. After the COMM port is selected, the software looks for the matrix system, "reads" its configuration, and then displays it in a window called "Extron's Matrix 6400 Control Program.

3. Click on TOOLS, the TOOLS menu is displayed. Click on Upgrade.

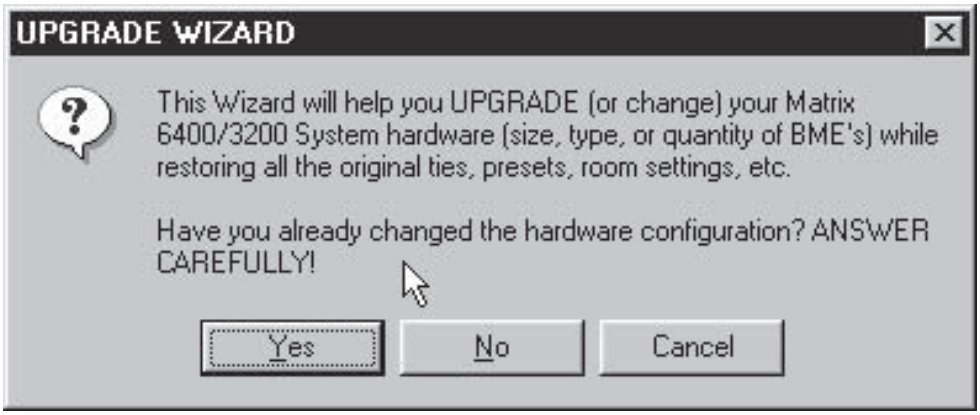
4. The "Upgrade Wizard" dialog box shown below will be displayed. The options are Yes, NO and Cancel. Click on "No" (since the hardware changes have NOT been installed at this point).

   - The current MATRIX settings will be saved in the MTRX6400.INI file.

   - The Matrix 6400 Control Pgm will shut down to allow you to power down the system to make the hardware changes.

5. Return to step 2 of the applicable procedure (Page 5-7 or 5-9).

Note: The "After Hardware Changes" procedure begins on Page 5-12.


UPGRADE WIZARD
This Wizard will help you UPGRADE (or change) your Matrix 6400/3200 System hardware (size, type, or quantity of BME's) while restoring all the original ties, presets, room settings, etc.
Have you already changed the hardware configuration? ANSWER CAREFULLY!
Yes
No
Cancel

### After Hardware Changes

Do the following steps AFTER the hardware upgrade has been installed:

1. From Windows open the Program Group or Folder called “Extron Electronics”.

2. Double click the “Matrix 6400 Control Pgm” icon to start the program. You will be asked to select the COMM port, or choose “Emulate” mode. After the COMM port is selected, the software looks for the matrix system, “reads” its configuration, and then displays it in a window called “Extron’s Matrix 6400 Control Program.

3. Click on TOOLS, the TOOLS menu is displayed. Click on Upgrade.

4. The “Upgrade Wizard” dialog box shown below will be displayed. The options are Yes, NO and Cancel. Click on ”Yes” (since the hardware changes have been installed at this point). The “Upgrade Wizard” does the following:

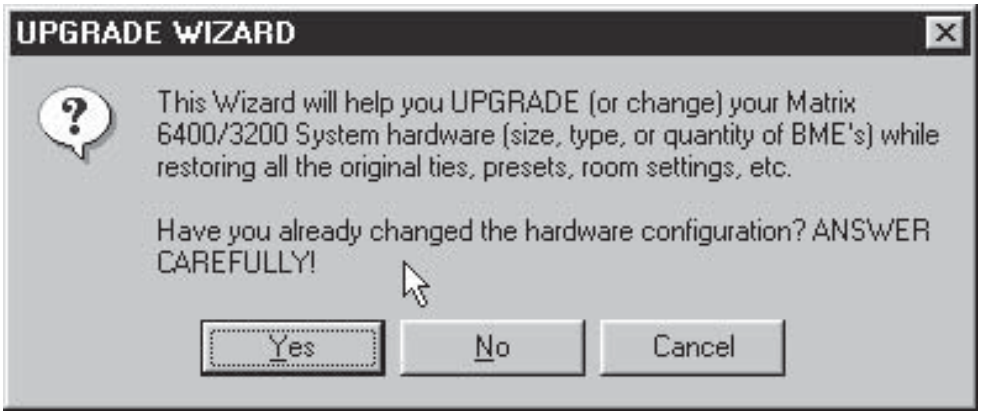
   - Presents the Virtual Configuration screen so you may re-virtualize the system to match your new hardware configuration.

   - Restores MATRIX settings from the MTRX6400.INI file saved before the hardware configuration was changed. All settings are restored from before, except the Map.

   - You may want to assign new icons and names to any Virtual IO ports that were newly created by your upgrade after the wizard has finished. This would also be the time to update your Room Configurations if needed.

5. Verify that the system (including the new hardware) is functioning correctly. If the system is not functioning as expected, call Extron Technical Support.

NOTE: The upgrade wizard also allows you to downgrade your system (remove hardware), but various Room and Preset settings may not fully restore since some of the Virtual input and output ports may no longer


UPGRADE WIZARD
This Wizard will help you UPGRADE (or change) your Matrix 6400/3200 System hardware (size, type, or quantity of BME's) while restoring all the original ties, presets, room settings, etc.
Have you already changed the hardware configuration? ANSWER CAREFULLY!
Yes
No
Cancel

*Notes*

# Appendix A
## Reference Information

*Switcher Part Numbers*

*Related Part Numbers*

*BNC Cables*

*Glossary of Terms*

## Matrix 3200/6400 Series Part Numbers

Part Numbers for Matrix 3200/6400 switchers use the following format:

60-25x-iofr

where:
- x = 0 = Matrix 6400 Wideband
- x = 1 = Matrix 3200 Wideband
- x = 2 = Matrix 6400 Video
- x = 3 = Matrix 3200 Video
- x = 4 = Matrix 6400 Sync
- x = 5 = Matrix 3200 Sync
- x = 6 = Matrix 6400 Audio

io = Inputs/Outputs (Matrix size). The i and the o are replaced by two characters which identify the exact size of the Matrix.

f = Front Panel Controller (FPC-1000)
f = 0 = No, f = 1 = Yes

r = Redundant Power Supply
r = 0 = No, r = 1 = Yes

An example of a typical Matrix 3200/6400 part number follows:

60-250-HD11

For this example:
- x = 0 = Matrix 6400 Wideband
- io = HD = 64x32 which was obtained from the Matrix 6400 Wideband Part Number Table on Page A-2.
- f = 1 = yes = Front Panel Controller
- r = 1 = yes = Redundant Power Supply

For the example above, the io characters would be HD for matrix size 64x32, DD for matrix size 32x32 and PH for matrix size 64x64.

The Matrix 3200 Wideband and Matrix 6400 Audio io characters are selected using the same procedure as is used with the Matrix 6400 Wideband, but with different tables as shown on Pages A-2 and A-3.

The io characters for the Matrix 3200 Sync part number are DD as it is only available in one matrix size, 32x32. The io characters for the Matrix 6400 Sync part numbers are PH as it is also available in only one matrix size, 64x64. Either of the two Sync part numbers may include r = 0 or 1 but f must be 0 as a Sync module cannot have a Front Panel Controller.

Matrix 3200/6400 Part Numbers (with matrix tables) are shown on Pages A-2 and A-3.

## Matrix 3200/6400 Series Part Numbers (continued from previous page)

| Extron Part | | | | Part # |
|---|---|---|---|---|
| **Matrix 6400 Wideband Switcher** | | | | **60-250-iofr** |
| Two io (Inputs/Outputs) characters = table matrix size coordinate points.<br>f = Front Panel Controller (FPC), 0 = No, 1 = Yes<br>r = Redundant Power Supply (RPS), 0 = No, 1 = Yes<br>Examples:<br>60-250-IE11 = 48 Inputs/40 Outputs 1-FPC & 1- RPS<br>60-250-HD10 = 64 Inputs/32 Outputs 1-FPC & 0-RPS<br>60-250-PH00 = 64 Inputs/64 Outputs 0-FPC & 0-RPS | | | | |
| Physical | Matrix 6400 Wideband (7U) | | | |
| Outputs | Physical Inputs | | | |
| | 16x | 32x | 48x | 64x |
| 8 | 60-250-AA | 60-250-BA | 60-250-CA | 60-250-DA |
| 16 | 60-250-AB | 60-250-BB | 60-250-CB | 60-250-DB |
| 24 | 60-250-BC | 60-250-DC | 60-250-FC | 60-250-HC |
| 32 | 60-250-BD | 60-250-DD | 60-250-FD | 60-250-HD |
| 40 | 60-250-CE | 60-250-FE | 60-250-IE | 60-250-LE |
| 48 | 60-250-CF | 60-250-FF | 60-250-IF | 60-250-LF |
| 56 | 60-250-DG | 60-250-HG | 60-250-LG | 60-250-PG |
| 64 | 60-250-DH | 60-250-HH | 60-250-LH | 60-250-PH |

| | | | |
|---|---|---|---|
| **Matrix 3200 Wideband Switcher** | | | **60-251-iofr** |
| Two io (Inputs/Outputs) characters = table matrix size coordinate points.<br>f = Front Panel Controller (FPC), 0 = No, 1 = Yes<br>r = Redundant Power Supply (RPS), 0 = No, 1 = Yes<br>Examples:<br>60-251-BB01 = 32 Inputs/16 Outputs 0-FPC & 1- RPS<br>60-251-DC10 = 32 Inputs/24 Outputs 1-FPC & 0-RPS<br>60-251-DD11 = 32 Inputs/32 Outputs 1-FPC & 1-RPS | | | |
| Physical | Matrix 3200 Wideband (5U) | | |
| Outputs | Physical Inputs | | |
| | 16x | 32x | |
| 8 | 60-251-AA | 60-251-BA | |
| 16 | 60-251-AB | 60-251-BB | |
| 24 | 60-251-BC | 60-251-DC | |
| 32 | 60-251-BD | 60-251-DD | |

| | | |
|---|---|---|
| **Matrix 6400 Video Switcher** | | **60-252-iofr** |
| Two io (Inputs/Outputs) characters = table matrix size coordinate points.<br>f = Front Panel Controller (FPC), 0 = No, 1 = Yes<br>r = Redundant Power Supply (RPS), 0 = No, 1 = Yes<br>Examples:<br>60-252-HD10 = 64 Inputs/32 Outputs 1-FPC & 0-RPS<br>60-252-HE11 = 64 Inputs/40 Outputs 1-FPC & 1- RPS<br>60-252-HH00 = 64 Inputs/64 Outputs 0-FPC & 0-RPS | | |
| Physical | Matrix 6400 Video (5U) | |
| Outputs | Physical Inputs | |
| | 64x | |
| 8 | 60-252-HA | |
| 16 | 60-252-HB | |
| 24 | 60-252-HC | |
| 32 | 60-252-HD | |
| 40 | 60-252-HE | |
| 48 | 60-252-HF | |
| 56 | 60-252-HG | |
| 64 | 60-252-HH | |

**Matrix 3200 Video Switcher** **60-253-iofr**

Two io (Inputs/Outputs) characters = table matrix size coordinate points.
f = Front Panel Controller (FPC), 0 = No, 1 = Yes
r = Redundant Power Supply (RPS), 0 = No, 1 = Yes
Examples:
60-253-DB01 = 32 Inputs/16 Outputs 0-FPC & 1- RPS
60-253-DC10 = 32 Inputs/24 Outputs 1-FPC & 0-RPS
60-253-DD11 = 32 Inputs/32 Outputs 1-FPC & 1-RPS

| Physical | Matrix 3200 Video (5U) |
|---|---|
| Outputs | Physical Inputs |
| | 32x |
| 8 | 60-253-DA |
| 16 | 60-253-DB |
| 24 | 60-253-DC |
| 32 | 60-253-DD |

**Matrix 6400 Sync Switcher** **60-254-PH0r**

r = Redundant Power Supply (RPS), 0 = No, 1 = Yes
Examples:
60-254-PH01 = 64 Inputs/64 Outputs with RPS
60-254-PH00 = 64 Inputs/64 Outputs without RPS

| Physical | Matrix 6400 Sync (7U) |
|---|---|
| Outputs | Physical Inputs |
| | 64x |
| 64 | 60-254-PH |

**Matrix 3200 Sync Switcher** **60-255-DD0r**

r = Redundant Power Supply (RPS), 0 = No, 1 = Yes
Examples:
60-255-DD01 = 32 Inputs/32 Outputs with RPS
60-255-DD00 = 32 Inputs/32 Outputs without RPS

| Physical | Matrix 3200 Sync (5U) |
|---|---|
| Outputs | Physical Inputs |
| | 32x |
| 32 | 60-255-DD |

**Matrix 6400 Audio Switcher** **60-256-iofr**

Two io (Inputs/Outputs) characters = table matrix size coordinate points.
f = Front Panel Controller (FPC), 0 = No, 1 = Yes
r = Redundant Power Supply (RPS), 0 = No, 1 = Yes
Examples:
60-256-HD01 = 64 Inputs/32 Outputs with RPS (no FPC)
60-256-HH10 = 64 Inputs/64 Outputs with FPC (no RPS)
60-256-DB11 = 32 Inputs/16 Outputs with FPC & RPS
60-256-BA00 = 16 Inputs/8 Outputs (no FPC, no RPS)

| Physical | Matrix 6400 Audio (5U) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Outputs | Physical Inputs | | | | | | | |
| | 8x | 16x | 24x | 32x | 40x | 48x | 56x | 64x |
| 8 | 60-256-AA | 60-256-BA | 60-256-CA | 60-256-DA | 60-256-EA | 60-256-FA | 60-256-GA | 60-256-HA |
| 16 | 60-256-AB | 60-256-BB | 60-256-CB | 60-256-DB | 60-256-EB | 60-256-FB | 60-256-GB | 60-256-HB |
| 24 | 60-256-AC | 60-256-BC | 60-256-CC | 60-256-DC | 60-256-EC | 60-256-FC | 60-256-GC | 60-256-HC |
| 32 | 60-256-AD | 60-256-BD | 60-256-CD | 60-256-DD | 60-256-ED | 60-256-FD | 60-256-GD | 60-256-HD |
| 40 | 60-256-AE | 60-256-BE | 60-256-CE | 60-256-DE | 60-256-EE | 60-256-FE | 60-256-GE | 60-256-HE |
| 48 | 60-256-AF | 60-256-BF | 60-256-CF | 60-256-DF | 60-256-EF | 60-256-FF | 60-256-GF | 60-256-HF |
| 56 | 60-256-AG | 60-256-BG | 60-256-CG | 60-256-DG | 60-256-EG | 60-256-FG | 60-256-GG | 60-256-HG |
| 64 | 60-256-AH | 60-256-BH | 60-256-CH | 60-256-DH | 60-256-EH | 60-256-FH | 60-256-GH | 60-256-HH |

## Matrix 3200/6400 Series Part Numbers (continued from previous page)

| Extron Part | Part # |
|---|---|
| FPC 1000 (Matrix 6400 Series) | 60-276-01 |
| FPC 1000 (Matrix 3200 Series) | 60-276-02 |
| MKP 1000 (Gray) | 60-239-01 |
| MKP 1000 (Black) | 60-239-02 |
| MKP 1000 (White) | 60-239-03 |
| MCP 1000M (Master) | 60-298-01 |
| MCP 1000S (Slave) | 60-298-02 |
| Stereo Audio Input Card (8 Inputs) | 70-069-01 |
| Stereo Audio Output Card (8 Outputs) | 70-070-01 |
| Wideband Input Card (16 Inputs) | 70-066-01 |
| Wideband Output Card (8 Outputs) | 70-067-01 |
| Video Output Card | 70-068-01 |

## Related Part Numbers

| Extron Part | Part # |
|---|---|
| Captive Screw Audio Connector | 10-319-10 |
| RCA (female) BNC (male) Adapter | 10-264-01 |
| SVHS - BNC Adapter | 26-353-01 |
| GLI 250 (Ground Loop Isolator, 250 MHz RGBHV) | 60-123-01 |
| MKP 1000 User's Manual | 68-355-01 |
| FPC 1000 User's Manual | 68-355-02 |
| Matrix 6400 Audio User's Manual | 68-355-03 |
| Matrix 3200/6400 System Virtualization/Control Software (2-Diskettes) | 29-036-01 |

## BNC Cables (Super High Resolution (SHR) BNC Cables)

Extron SHR BNC cables are Super High Resolution BNC cables. Extron recommends that when using signals with a scanning frequency of 15-125 kHz and running distances of 100 feet or more, high resolution BNC cables should be used to achieve maximum performance.

| Extron Part | Part # |
|---|---|
| **Bulk Cable** | |
| **SHR Bulk Cable** | |
| Bulk SHR-1, 500' | 22-098-02 |
| Bulk SHR-1, 1000' | 22-098-03 |
| Bulk SHR-4, 500' | 22-099-02 |
| Bulk SHR-5, 500' | 22-100-02 |
| BNC SHR crimp connectors, qty. 50 | 100-075-51 |
| **BNC-4 MINI-HR Bulk Cable** | |
| Bulk BNC 4-500' HR | 22-032-02 |
| Bulk BNC 4-1000' HR | 22-032-03 |
| **BNC 5 MINI-HR Bulk Cable** | |
| Bulk BNC 5-500' HR | 22-020-02 |
| Bulk BNC 5-1000' HR | 22-020-03 |
| **BNC 5 Plenum MINI-HR BULK Cable** | |
| Bulk BNC 5-500' HRP | 22-103-02 |
| Bulk BNC 5-1000' HRP | 22-103-03 |
| **Six Counductor HR Cable** | |
| Bulk Six Conductor High Res., 500' | 22-124-02 |
| **Install Plenum Bulk Cable** | |
| Bulk Install Plenum, 500' | 22-111-03 |
| Bulk Install Plenum, 1000' | 22-111-04 |
| **Assorted Connectors** | |
| **BNC Connectors** | |
| BNC MINI-HR crimp connectors, qty. 50 | 100-074-51 |
| BNC SHR crimp connectors, qty. 50 | 100-075-51 |
| BNC Bulkhead connectors, qty. 50 (for custom wall plates) | 100-076-51 |

### Pre-cut Cables

The BNC-4 HR is used for RGBS cable runs and the BNC-5 is used for RGBHV cable runs, but either type can also be used for composite video, S-Video or RGB with sync on green. All Extron BNC cables have male gender connectors on both ends. Also available is a plenum version of the BNC-5 HR cabling.

| | |
|---|---|
| **BNC-4 HR Cable** | |
| BNC-4-25'HR (25 feet/7.5 meters) | 26-210-04 |
| BNC-4-50'HR (50 feet/15.0 meters) | 26-210-05 |
| BNC-4-75'HR (75 feet/23.0 meters) | 26-210-06 |
| BNC-4-100'HR (100 feet/30.0 meters) | 26-210-07 |
| BNC-4-150'HR (150 feet/45.0 meters) | 26-210-08 |
| BNC-4-200'HR (200 feet/60.0 meters) | 26-210-09 |
| BNC-4-250'HR (250 feet/75.0 meters) | 26-210-54 |
| BNC-4-300'HR (300 feet/90.0 meters) | 26-210-53 |
| **BNC-5 HR Cable** | |
| BNC-5-25'HR (25 feet/7.5 meters) | 26-260-03 |
| BNC-5-50'HR (50 feet/15.0 meters) | 26-260-04 |
| BNC-5-75'HR (75 feet/23.0 meters) | 26-260-16 |
| BNC-5-100'HR (100 feet/30.0 meters) | 26-260-05 |
| BNC-5-150'HR (150 feet/45.0 meters) | 26-260-12 |
| BNC-5-200'HR (200 feet/60.0 meters) | 26-260-06 |
| BNC-5-250'HR (250 feet/75.0 meters) | 26-260-18 |
| BNC-5-300'HR (300 feet/90.0 meters) | 26-260-14 |

*Bulk cable in lengths up to 5000' rolls is available with or without connectors.*

### Binary/Hex/Decimal Conversion Table

| Decimal value | | n/a | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| Dec. | Hex | Add the decimal values above for equivalents. | | | | | | | |
| 0 | 80/00h | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 81/01h | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2 | 82/02h | n/a | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 3 | 83/03h | n/a | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 4 | 84/04h | n/a | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 5 | 85/05h | n/a | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 6 | 86/06h | n/a | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 7 | 87/07h | n/a | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 8 | 88/08h | n/a | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 9 | 89/09h | n/a | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 10 | 8A/0Ah | n/a | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 11 | 8B/0Bh | n/a | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 12 | 8C/0Ch | n/a | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 13 | 8D/0Dh | n/a | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| 14 | 8E/0Eh | n/a | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 15 | 8F/0Fh | n/a | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 16 | 90/10h | n/a | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| etc. | | | | | | | | | |
| 32 | A0/20h | n/a | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| etc. | | | | | | | | | |
| 64 | C0/40h | n/a | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| etc. | | | | | | | | | |
| 99 | E3/63h | n/a | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 100 | E4/64h | n/a | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| etc. | | | | | | | | | |
| 127 | FF/7F | n/a | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Glossary of terms

Following is a list of terms taken from Extron's Glossary.

**AC** – **Alternating Current** – Flow of electrons that changes direction alternately.

**ADA** – Extron's product designation for Analog Distribution Amplifier.

**AMPS** – **Amperes** – A unit of measurement for current.

**Analog** – **Analogue** – A continuous signal that takes time to make a transition from one level to another. Standard audio and video signals are analog. This signal has an infinite number of levels between its highest and lowest value. (Not represented by bits, such as with digital.)

**ANSI** – American National Standards Institute

**ASCII** – American Standard Code for Information Interchange – The standard code consisting of 7-bit coded characters (8 bits including parity check), utilized to exchange information between data processing systems, data communication systems, and associated equipment. The ASCII set contains control characters and graphic characters.

**Attenuation** – The decrease in magnitude of a signal.

**Audio Follow** – A term used when audio is tied to other signals, such as video, and they are switched together. (The opposite of Break-away)

**Balanced Audio** – A method that uses three conductors for one audio signal. They are plus (+), minus (-) and ground. The ground conductor is strictly for shielding, and does not carry any signal. Also Differential Audio.

**Bandwidth** – A frequency range, or "band" of frequencies, within which a device operates. In audio and video, it is the band of frequencies that can pass through a device without significant loss or distortion. The higher the bandwidth, the sharper the picture; low bandwidth can cause a "fuzzy" picture.

**Barrel** – Outward curved edges on a display image. Also see "pincushion".

**Blanking** – The turning off of the electron beam that scans the image onto the screen. When the beam completes a scan line it must return (retrace) back to the left. During this time, the beam must be turned off (horizontal blanking). Similarly, when the last line has been scanned at the bottom of the screen, the beam must return to the upper left. This requires vertical blanking.

**Blooming** – Most noticeable at the edges of images on a CRT, "blooming" is when the light (color) is so intense that it seems to exceed the boundary of the object. Thin lines and sharp edges could look thick and fuzzy. This may be caused by the brightness being set to high, or by a high voltage problem.

**BNC** – It is a cylindrical Bayonet Connector which operates with a twist-locking motion. Two curved grooves in the collar of the male connector are aligned with two projections on the outside of the female collar. This allows the connector to be locked in place without the need of tools.

**Break-away** – The ability to separate signals for the purpose of switching them independently. For example: an audio and video signal from the same source may be "broken away" and switched to different destinations. This is the opposite of the term "follow".

**Buffer** – Generally referred to as a unity gain amplifier used to isolate the signal source from the load. This is for both digital and analog signals.

**Cable Equalization** – The method of altering the frequency response of a video amplifier to compensate for high frequency losses in cables that it feeds. (See Peaking.)

**Capacitance** – The storing of an electrical charge. At high frequencies, capacitance that exists in cables also represents a form of impedance.

**Cathode Ray Tube** – See CRT.

**Chroma** – The characteristics of color information, independent of luminance intensity. Hue and saturation are qualities of chroma. Black, gray, and white objects do not have chroma characteristics.

**Chrominance Signal** – Part of a television signal containing the color information. Abbreviated by "C".

**Coaxial Cable** – A two-conductor wire in which one conductor completely wraps the cable.

**Component Video** – Our color television system starts with three channels of information; Red, Green, & Blue (RGB). In the process of translating these channels to a single composite video signal they are often first converted to Y, R-Y, and B-Y. Both 3-channel systems, RGB and Y, R -Y, B -Y are component video signals. They are the components that eventually make up the composite video signal. Much higher program production quality is possible if the elements are assembled in the component domain.

**Composite Sync** – A signal consisting of horizontal sync pulses, vertical sync pulses, and equalizing pulses only, with no signal reference level.

**Composite Video** – A mixed signal comprised of the luminance (black and white), chrominance (color), blanking pulses, sync pulses and color burst.

**Contrast** – The range of light and dark values in a picture or the ratio between the maximum and the minimum brightness values. Low contrast is shown mainly as shades of gray, while high contrast is shown as blacks and whites with very little gray. It is also a TV monitor adjustment which increases or decreases the level of contrast of a televised picture.

**Crosstalk** – Interference from an adjacent channel which adds an undesirable signal to the desired signal.

**Crosstalk Isolation** – Attenuation of an undesired signal introduced by crosstalk from an adjacent channel.

**CRT** – **Cathode Ray Tube** – A vacuum tube that produces light when energized by the electron beam generated inside the tube. A CRT has a heater element, cathode, and grids in the neck of the tube, making up the “gun”. An electron beam is produced by the gun and is accelerated toward the front display, or screen surface of the tube. The display surface contains phosphors that light up when hit by the electron beam. The CRT is more commonly known as picture tube.

**dB** – **Decibel** – The standard unit used to express gain or loss of power. It indicates the logarithmic ratio of output power divided by input power. A power loss of 3 dB is an attenuation of half of the original value. The term “3dB down” is used to describe the “half power point”.

**DC** – **Direct Current** – The flow of electrons in one direction.

**D Connector** – A connector with rounded corners and angled ends, taking on the shape of the letter “D”. Commonly used in computers and video.

**Decibel** – See dB.

**Decoder** – A device used to separate the RGBS (Red, Green, Blue and Sync) signals from a composite video signal.

**Differential Audio** – See Balanced Audio.

**Distribution Amplifier** (DA) – A device that allows connection of one input source to multiple output sources such as monitors or projectors.

**FCC** – Federal Communications Commission – A unit of the U.S. Government that monitors and regulates communications.

**Field** – In interlaced video, it takes two scans on a screen to make a complete picture, or a “Frame”. Each scan is called a “Field”. Sometimes these are referred to as “field 1 and field 2”.

**Flicker** – Flicker occurs when the electron gun paints the screen too slowly, giving the phosphors on the screen time to fade.

**Frame** – In interlaced video, a Frame is one complete picture. A Frame is made up of two fields, or two sets of interlaced lines.

**Frequency Range** – Refers to the low-to-high limits of a device, such as a computer, projector or monitor. Also “bandwidth”.

**Gain** – A general term used to denote an increase in signal power or voltage produced by an amplifier in transmitting a signal from one point to another. The amount of gain is usually expressed in decibels above a reference level. Opposite of Attenuation.

**Genlock** – A method of synchronizing video equipment by using a common, external “Genlock” signal.

**Hertz** – **Hz** – A measure of frequency in cycles per second.

**High Impedance** – **Hi Z or High Z** – In video, when the signal is not terminated locally and is going to another destination, where it will be terminated. In video, Hi Z is typically 10k ohms or greater.

**Horizontal Rate** – **Horizontal Frequency** – The number of complete horizontal lines, including trace and retrace, scanned per second. Typically shown as a measure of kHz.

**Horizontal Resolution** – Smallest increment of a television picture that can be discerned in the horizontal plane. This increment is dependent upon the video bandwidth and is measured in frequency. Determines the number of lines it takes to scan an image on the screen.

**Hue** – **Tint Control** – Red, yellow, blue, etc. are hues of color or types of color. Hue is the parameter of color that allows us to distinguish between colors.

**Hz** – **Hertz** – Frequency in cycles per second.

**Impedance** – **Z** – The opposition or "load" to a signal. Circuits that generate audio or video signals, are designed to work with a certain "load", or impedance. Typical video impedances: 75 ohm or High Z. Also see High Impedance and Low Impedance.

**Interlaced** – The process of scanning whereby the alternate lines of both scanned fields fall evenly between each other.

**IRE Scale** – An oscilloscope scale that applies to composite video levels. Typically there are 140 IRE units in one volt (1 IRE = 7.14 mV).

**K** – An abbreviation for kilobyte. A kilobyte is 1,000 bytes. In computer memory sizes, the numbers are rounded down. e.g. 1k byte = 1024 bytes.

**Kilohertz** – **kHz** – Thousands of Hertz, or a frequency rate in units of thousands of cycles per second. For example, CGA's horizontal scan rate is 15.75 kHz or 15,750 hertz (Hz).

**LED** – Light-Emitting Diode

**Level Control** – The Level Control on selected Extron interface products is similar to the Contrast Control on a data monitor. It can either increase or decrease the output voltage level of the interface to the connected data monitor or projector. This results in greater or less contrast in the picture.

**Low Impedance** – The condition where the source or load is at a lower impedance than the characteristic impedance of the cable. Low source impedances are common; low load impedances are usually fault conditions.

**Luminance** – This is the signal that represents brightness in a video picture. Luminance is any value between black and white. In mathematical equations, luminance is abbreviated as "Y".

**M** – **Mega** – An abbreviation for megabyte. A megabyte is 1024K, or roughly a million bytes (1,048,076 to be exact [1024 x 1024]).

**Matrix** – In A/V, an electronic device used to collect and distribute video (and sometimes audio) signals. See matrix switcher.

**Matrix switcher** – In audio/video, a means of selecting an input source and connecting it to one or more outputs. A Matrix switcher would normally have multiple inputs and multiple outputs.

**MHz** (as in 8 MHz) – An abbreviation for megahertz. This is a unit of measurement and refers to a million cycles per second. Bandwidth is measured in megahertz.

**Milli** – **m** – Abbreviation for one thousandth. Example: 1 ms = 1/1000 second.

**Monitor** – (A) A TV that may receive its signal directly from a VCR, camera or separate TV tuner for high quality picture reproduction. It may not contain a channel selector. (B) A video display designed for use with closed circuit TV equipment. (C) Device used to display computer text and graphics.

**Non-Interlaced** – Also called progressive scan – a method by which all the video scan lines are presented on the screen in one sweep instead of two (also see interlaced).

**Nonvolatile memory –** Memory that retains data when power is turned off.

**NTSC** – **National Television Standards Committee** – Television standard for North America and certain countries in South America. 525 lines/60 Hz (60 Hz Refresh).

**Output** – The product of an operation by a device going to some external destination, such as another device, a video screen, image or hard copy.

**PAL** – **Phase Alternate Line** – The phase of the color carrier is alternated from line to line. It takes four full pictures for the color horizontal phase relationship to return to the reference point. This alternation helps cancel out phase errors, the reason the hue control is not needed on PAL TV sets. PAL, in its many forms is used extensively in Western Europe.

**PCB** – **Printed Circuit Board**

**Peak-to-Peak** – abbreviated **p-p** – The amplitude (voltage) difference (as displayed on an oscilloscope) between the most positive and the most negative excursions (peaks) of an electrical signal.

**Peaking** – A means of compensating for mid and high frequency RGB Video Bandwidth response in data monitors and projectors and for signal losses due to cable capacitance. When using the Peak enhancements, use the following guidelines for proper output settings: Use 50% with all computer frequencies between 15-125 kHz at any cable length. Use 100% with high frequency computers of 36 kHz or higher with cable lengths 75 feet or greater.

**Pincushion** – The inward or outward (curved) appearance of the edges of a display.

**Pin-out** – An illustration or table that names signals, voltages, etc. that are on each pin of a connector or cable.

**Plenum Cable** – Cable having a covering that meets the UL specifications for resistance to fire.

**PLUGE** – **Picture Line Up Generation Equipment** – This is a name of a test pattern that assists in properly setting picture black level. PLUGE can be part of many test patterns. The phrase and origination of the test signal are both credited to the BBC.

**Power** – **Electrical** – The dissipation of heat by passing a current through a resistance. Measured in Watts (W), it is expressed by Ohm's law from the two variables: Voltage (E) and Current (I). i.e. $P = I^2xR$, or, $P = E^2/R$ or $P = ExI$

**Resolution** – The density of lines or dots that make up an image. Resolution determines the detail and quality in the image.
A) A measure of the ability of a camera or television system to reproduce detail.
B) In video, generally called horizontal resolution. It can be evaluated by establishing the limit to which lines can be distinguished on a test pattern. A larger resolution value means a broader frequency band of the video signal.
C) A measure of the greatest amount of detail that can be seen in an image. Often incorrectly expressed as a number of pixels in a given line; more correctly it is the bandwidth.

**RGB** – **Red, Green, Blue** – The basic components of the color television system. They are also the primary colors of light, not to be confused with Cyan, Magenta, and Yellow, the primary pigments. Also called the "Additive Color Process".

**RGB Video** – A form of color video signal (red, green, blue) distinctly different from the composite color video used in standard television sets. RGB can be displayed only on a color monitor that has a separate electron gun for each of these primary colors. Some color television sets use only one gun. RGB monitors are noted for their crisp, bright colors and high resolution.

**RS-170A** – EIA technical standard NTSC color TV.

**RS-232** – An Electronic Industries Association (EIA) serial digital interface standard specifying the electrical and mechanical characteristics of the communication path between two devices using D-type connectors. This standard is used for relatively short range communications and does not specify balanced control lines.

**RS-422** – An EIA serial digital interface standard which specifies the electrical characteristics of balanced voltage digital interface circuits. This standard is usable over longer distances than RS-232. Although originally designed for use with 9-pin and 37-pin, D-type connectors, it is often used with others, including 25-pin D-types. It is also used as the serial port standard for Macintosh computers. This signal governs the asynchronous transmission of computer data at speeds of up to 920,000 bits per second.

**SECAM** – **Sequential Couleur Avec Memoiré** – Translated as “Sequential Color with Memory”. A composite color transmission system that potentially eliminates the need for both a color and hue control on the monitor. One of the color difference signals is transmitted on one line and the second is transmitted on the second line. Memory is required to obtain both color difference signals for color decoding. This system is used in France, Africa, Asia and many Eastern European countries.

**Serial Port** – An output on the computer that allows it to communicate with other devices in a serial fashion – data bits flowing on a single pair of wires. The serial port is most often used with RS-232 protocol.

**SMPTE** – **Society of Motion Picture and Television Engineers** – A global organization, based in the United States, that sets standards for base-band visual communications. This includes film as well as video standards.

**SMPTE Pattern** – The video test pattern made up of color, black, and white bands used by television stations.

**Software** – The programs used to instruct a processor and its peripheral equipment.

**Switcher** – Term often used to describe a special effects generator; a unit which allows the operator to switch between video camera signals. Switchers are often used in industrial applications to switch between video camera monitoring certain areas for display on a monitor, or system of display devices. These kinds of switchers do not have sync generators.

**Sync** – In video, a means of synchronizing signals with timing pulses to insure that each step in a process occurs at exactly the right time. For example: Horizontal Sync determines exactly when to begin each horizontal line (sweep) of the electron beam. Vertical Sync determines when to bring the electron beam to the top-left of the screen to start a new field. There are many other types of sync in a video system. (Also called Sync Signal or Sync Pulse.)

**SVHS** – A high band video recording process for VHS that increases the picture quality and resolution capability. See S-Video.

**S-Video** – The composite video signal is separated into the Luminance (Y) and the Chrominance (C).

**Terminal** – A device typically having a keyboard and display that is capable of sending text to and receiving text from another device, a network, etc.

**Termination** – A load, or impedance at the end of a cable or signal line used to match the impedance of the equipment that generated the signal. The impedance absorbs signal energy to prevent signal reflections from going back toward the source. In the video industry, termination impedance is typically 75 ohms.

**Vertical Interval** – The synchronizing information which is presented between fields, and then signals the picture monitor to return to the top of the screen to start another vertical scan.

**Videoconferencing** — Conducting a conference between two or more locations using video cameras, microphones and video monitors. The participants can be seen, as well as heard. Referred to as a “virtual conference room”.

**Virtual conference room** — See videoconferencing.

**Virtual map** — Used with Extron’s virtual matrix switchers (Matrix 3200/6400), a virtual map is made up of tables stored in memory that relate physical connectors (as on the back panel) to logical connections (as seen by the user). In printed form, this can show physical input/output connector numbers as they relate to virtual input/output numbers.

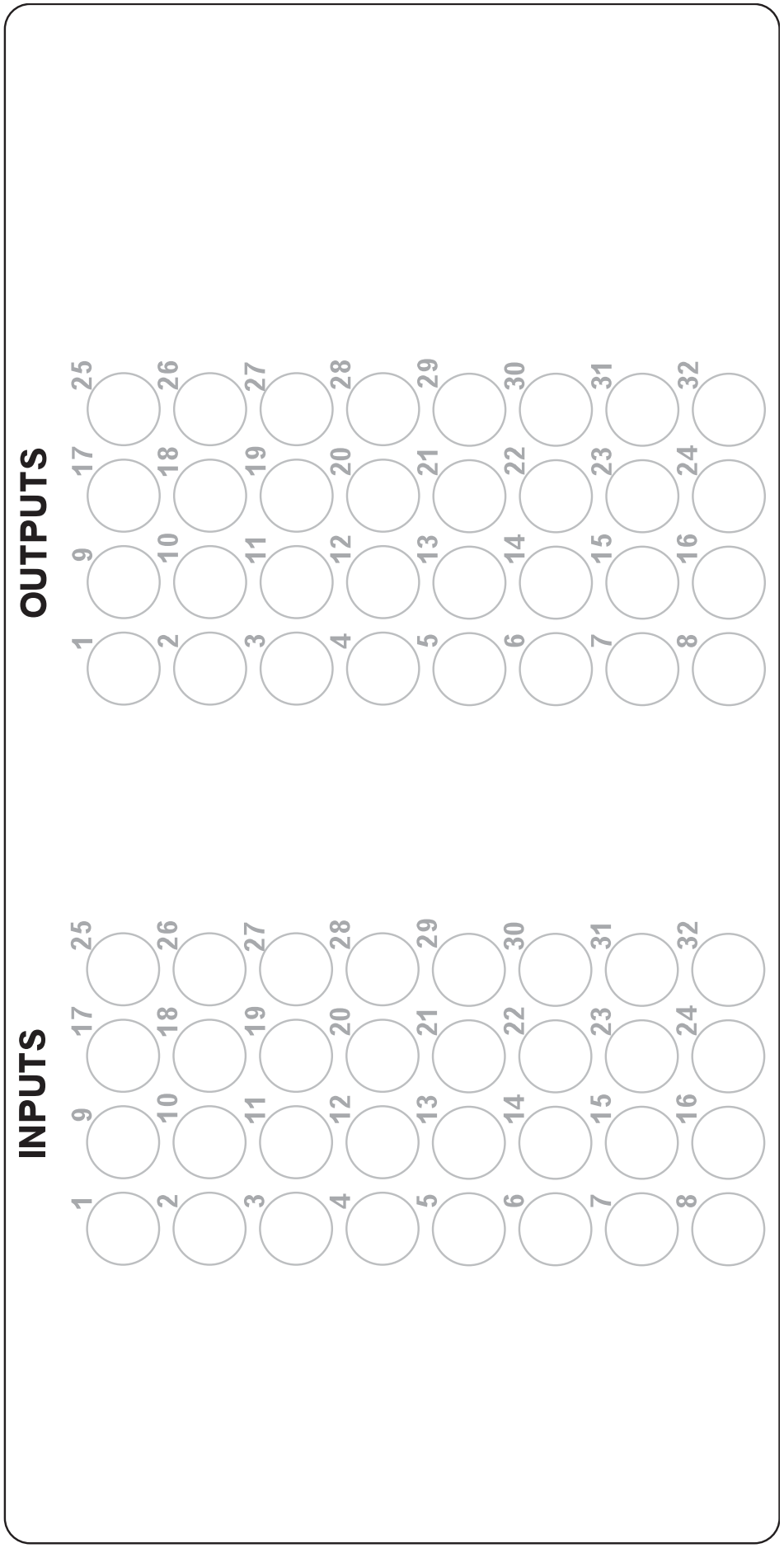
**Virtual memory** — The process of increasing the apparent size of a computer’s random-access memory (RAM) by using a section of the hard disk storage as an extension of RAM.

**Virtual switching** — A means of making real, physical input or output ports appear to have different numbers. For example, Extron’s Matrix 3200/6400 switchers can be programmed to switch a set (group) of connectors as one. Also see virtual map.

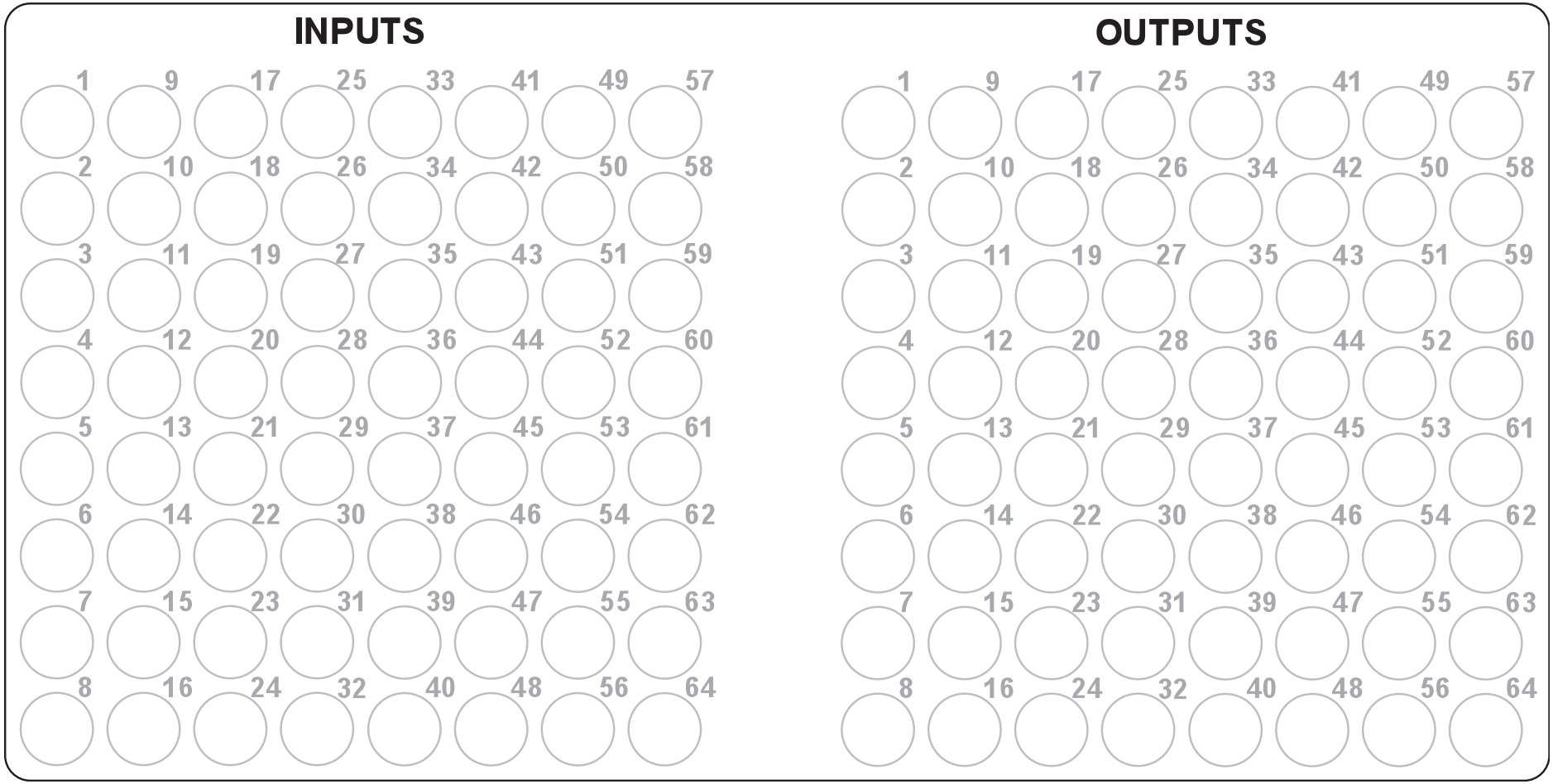
**Wideband** – A relative term indicating a high bandwidth.

**Y** – In video, “Y” is an abbreviation for Luminance.

**Z** – A symbol for impedance.




Matrix 3200 Video Switcher Virtualization Work-sheet




Matrix 6400 Video Switcher Virtualization Work-sheet

*Notes*

# FCC Class A Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Note: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

# Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

**USA, Canada, South America, and Central America:**

Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805, USA

**Europe, Africa, and the Middle East:**

Extron Electronics, Europe
Beeldschermweg 6C
3821 AH Amersfoort
The Netherlands

**Asia:**

Extron Electronics, Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363

**Japan:**

Extron Electronics, Japan
Daisan DMJ Bldg. 6F,
3-9-1 Kudan Minami
Chiyoda-ku, Tokyo 102-0074
Japan

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions or non-Extron authorized modification to the product.

***If it has been determined that the product is defective, please call Extron and ask for an Applications Engineer at (714) 491-1500 (USA), 31.33.453.4040 (Europe), 65.6383.4400 (Asia), or 81.3.3511.7655 (Japan) to receive an RA# (Return Authorization number). This will begin the repair process as quickly as possible.***

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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